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ABSTRACT

Part I of the second of four volumes in Research Report No. 7 of the Health Services Mobility Study (HSMS), this book contains 76 task descriptions covering most of the medical activities carried out by radiologic technologists. Chapter I of this volume defines "tasks" and tells how the descriptions were developed. Chapter 2 lists the tasks by system or area of the body, by the type of task function involved (such as "plain film" examinations, contrast examinations, teaching), and by main type of recipient (e.g., patient, pediatric patient, etc.). The steps of the task descriptions are presented in logical sequence in considerable detail by Code Number in Chapter 3, (part of which is in this book, Part I, the remainder in Vol. 2, Part II). (The work carried out by diagnostic radiologists and the tasks of administrative, machine-related, and nursing-type functions are found in Volumes 1 and 3. Volume 4 is an index of all the tasks in the three volumes. These task descriptions are offered for use as instructional materials, design of career ladders, for the structuring of jobs, and as inputs to the development of performance evaluation instruments and proficiency tests). (HD)

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TASK DESCRIPTIONS IN DIAGNOSTIC RADIOLOGY

Research Report No. 7

Volume 2

RADIOLOGIC TECHNOLOGIST TASKS DEALING WITH PATIENT PROCEDURES

Part I: Tasks 7 Through 386

by
Eleanor Gilpatrick, Director
Health Services Mobility Study

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We are grateful to the radiologic technologists at Montefiore who gave us long hours of interview, observation or review time so that their work could be described. These included Alicia Benjamin, Michael Daly, Mitchell Finkelstein, Neville McWatt, Effraim Mercado, Myrna Roach, and Hector Rodriguez. We also appreciate the cooperation of Barbara Laughinghouse at Mt. Sinai Hospital and Medical Center in New York City.

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Francis N. Ham, Jr., Field Engineer at EMI Medical Inc.,reviewed our tasks in computerized transverse axial tomography, as did Mitchell L. Finkelstein, formerly Assistant Chief Technologist at Montefiore Hospital, members of the Training Specialist staff of Pfizer Medical Systems, Inc., and Gene Moss, formerly of the staff of BRH.

Our literature sources have been numerous; but special acknowledgement is due Vinita Merrill, whose Atlas of Roentgenographic Positions and Standard Radiologic Procedures (3rd and 4th Editions, St. Louis: The C.V. Mosby Company, 1967, 1975) proved extremely valuable.

We thank these professionals for their help. Any mistakes remaining, or controversial issues still unresolved in the task descriptions, are solely the responsibility of the Health Services Mobility Study.

The bulk of the field work for these task descriptions was carried out by HSMS job analysts Jeanne Bertelle, Albertine Brown, Sandra M. Ostling, and Irene A. Seifer. The very demanding job of typing the tasks was supervised and largely carried out by Julia M. Caldwell.

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PREFACE

The Health Services Mobility Study (HSMS) has been involved in research in the health manpower field in the United States since 1967. It has designed methods to analyze jobs, create job ladders, develop curriculum objectives, and evaluate performance. HSMS is sponsored by the City University of New York (CUNY) through the Research Foundation and the Hunter College School of Health Sciences. Since 1967, funding for HSMS has come from the Office of Economic Opportunity, the Health Services and Mental Health Administration and the Bureau of Health Manpower, both of HEW, and, primarily, the U. S. Department of Labor, Manpower Administration, now the Employment and Training Administration. The Director of the Project, Eleanor Gilpatrick, holds the rank of Associate Professor at the Hunter College School of Health Sciences, City University of New York.

This report presents the core data of the first application of the HSMS task analysis method to an entire functional area, i.e., Diagnostic Radiology. This work is reported in two Research Reports as follows:

Research Rpt. No. 7	TASK DESCRIPTIONS IN DIAGNOSTIC RADIOLOGY
Vol. 1	Medical Tasks: What the Radiologist Does.
Vol. 2	Radiologic Technologist Tasks Dealing With Patient Procedures.
Vol. 3	Machine-Related, Patient Care and Administrative Tasks: What Radiologists, Technologists, Nurses, and Physicists Do To Run Things and Look After Patients and Equipment.
Vol. 4	Index of Tasks by Code Number and Extended Name.

These four volumes are the "core" documents, i.e., they present approved "normative" task descriptions in radiology. The first three volumes present the tasks in a given area in numerical order by code number. Each document describes how the tasks were developed and how to read them. Each includes listings that arrange the tasks by specialty or function. Volume 4 summarizes the tasks presented in the first three volumes. It lists the extended names of all the tasks in numerical order by task code number, citing the volume in which the task description is to be found.

Research Rpt. No. 8	USING TASK DATA IN DIAGNOSTIC RADIOLOGY
Vol. 1	Job Ladders in Diagnostic Radiology: Assigning Tasks to Jobs.
Vol. 2	Safe Practice and Radiation Health Protection Aspects of Tasks.
Vol. 3	Curriculum Objectives For Radiologic Technology.

These volumes make use of and refer to the tasks presented in Research Report No. 7. Therefore, only the abbreviated names of tasks and their code numbers are used when the tasks are discussed.

Volume 1 shows the assignment of tasks to levels, indicates how tasks relate to one another, and makes recommendations on a job ladder and job structuring. It summarizes and includes the skill and knowledge data related to the tasks in Research Report No. 7. It tells the hospital administrator how to use the data for assigning tasks to titles and jobs.

Volume 2 highlights the safe practice features of the task descriptions.

Volume 3 presents the curriculum objectives for use in an educational program at the radiologic technologist level. Research Report No. 7 serves as instructional materials in connection with this volume.

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FOREWARD

The contents of these volumes include the Radiologic Technology tasks dealing with patient procedures, from the initial phase of the procedure, the desired output, inclusive of each step, to the completion of the task.

One might be inclined to state that the contents of these volumes is based upon instructional strategies; in a sense they are. In developing the tasks, it was evident that such an ambitious undertaking is based upon a premise. The premise is that for too long Radiologic Technology has been lagging in the basic educational principles in clinical education; therefore, instructional strategies utilize the elements of current educational theory coupled with the expertise of noted educators and practitioners within the profession of Radiologic Technology.

Although Radiologic Technologists have contributed to the documents by reviewing, evaluating, and when necessary, commenting on certain tasks or terminology, it should be understood that the evaluation and comments were the professional opinion of the technologist, and is not reflective of any position of the American Society of Radiologic Technologists.

One final note: The title of this work, Task Description in Diagnostic Radiology, is just that, task descriptions. No attempt is made to impose the content on managers or educators in the profession of Radiologic Technology. They are free, of course, to use the task's descriptions whatever way deemed appropriate. We hope that these volumes dealing with patient care will be helpful to you in providing the best possible education for your staff.

Ward M. Keller, R.T.

Ward M. Keller, R.T.
Director of Education
The American Society of
Radiologic Technologists

FOREWORD

The Bureau of Radiological Health of the Food and Drug Administration is responsible for minimizing unnecessary exposure of the population to radiation, including that used in medicine. The Bureau's programs include activities to improve the education of health care personnel in the safe use of radiation. This is important because adequate education of professional and ancillary personnel who prescribe, conduct or interpret radiologic examinations is a crucial determinant in assuring optimum medical care with minimum radiation exposure.

The educational process in the medical radiation area, as in any field, can be most effective when it is based upon the actual tasks and responsibilities which individuals will be called upon to undertake in practice. Systematically and comprehensively identifying and describing those tasks is thus an important prerequisite in designing effective curricula and credentialing tools. The type of research which is represented by the series of projects entitled "Task Descriptions in Diagnostic Radiology," conducted by the Health Services Mobility Study, can be an important step in this direction. These particular projects, culminating in several individual reports, contain task descriptions and curriculum objectives of remarkable depth and scope, including much material on protecting patients against unnecessary radiation exposure.

Although the Bureau of Radiological Health has not contributed to the design of these projects or to the content of the reports, we hope that they can serve as a useful resource for those responsible for designing basic and continuing educational programs for medical radiation users, and thus that they can contribute to the safe and effective use of radiation in medical diagnosis.

Mark Barnett
Associate Director
Division of Training & Medical Applications
Bureau of Radiological Health
Food and Drug Administration

CHAPTER 1

ABOUT THE TASK DESCRIPTIONS

INTRODUCTION

Research Report No. 7 is a product of the first full-scale demonstration of the task description method of the Health Services Mobility Study (HSMS). All the work found in a department of Diagnostic Radiology is presented as task descriptions in the three volumes of the Report.

This volume contains 76 task descriptions of which most are examination tasks carried out by radiologic technologists. These descriptions were prepared and reviewed over the period August, 1972, through March, 1976.

The medical work carried out by radiologists and the tasks of administration, film processing, machine maintenance, nursing, and housekeeping are found in Volumes 1 and 3. Volume 4 is an index of all the tasks in the three volumes.

These task descriptions are offered for use as instructional materials, as inputs to the design of career ladders, for the structuring of jobs and assignment of work to job titles, and as inputs to the development of performance evaluation instruments and proficiency tests. In Research Report No. 8, HSMS uses technologist-level tasks to design curriculum objectives. In addition, because the descriptions present desirable work behaviors, we believe that the task descriptions can be used to improve the quality of work, especially with regard to radiation protection and patient safety, and can be used for human resources development, planning, and counseling. The materials are adaptable for consumer education as well.

In order for the reader to use this material, he needs to know how it was collected and developed, what the tasks cover, how HSMS defines "task," and how to read the task descriptions. This chapter presents such information. Chapter 2 is a guide to the tasks. It arranges the abbreviated names of the tasks in several logical groupings with the code numbers given so the reader can get to the tasks that interest him or her. The groupings in Chapter 2 list the tasks by system or area of the body, by the type of task function involved (such as "plain film" examinations, contrast examinations, teaching), and by main type of recipient (such as any patient, pediatric patient, etc.). The task descriptions are presented in numerical order by code number in Chapter 3. Part I covers tasks 7 through 386; and Part II covers tasks 387 through 526.

ABOUT THE TASKS: COLLECTION AND COVERAGE

The HSMS task definition is presented later in this chapter. This section describes how the task descriptions were developed and indicates the coverage in this volume.

Orientation

If one conceives of all the kinds of work that get done in a department in order for it to carry out the function of diagnostic radiology, one might think of a great field or pool of work. Each kind of work is carried out in discrete units. Theoretically, it does not matter how the units are allocated to jobs, as long as all the work is done. In practice, although common sense is usually enough to discern that some tasks require someone trained in radiologic technology, there are always areas where it is unclear who should do what.

The HSMS method avoids this issue until it is clear what the work units are. Only at a later stage do we determine the skill and knowledge requirements for work units and their relative levels. The HSMS method begins with descriptions of all the work units, regardless of the job titles in which they are found.[1] We call the work units "tasks."

This volume is the second of three that together present most of the work that is done in a department of Diagnostic Radiology. Since we needed to divide the task descriptions into manageable volumes, we arbitrarily determined that this volume would contain task descriptions that refer to the radiographic examinations of patients done by technologists, and the teaching and evaluation of such work. Other work that may be carried out by radiologic technologists, nurses, physicists or radiologists of an administrative, machine-related or nursing-type function appear in Volume 3. Volume 1 contains the medical tasks of the radiologist.

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[1] This assignment of work units to jobs varies according to the size of an institution, local practices and laws, relative scarcities of types of manpower, and the extent to which an institution is rationally organized.

Collection of Data

Chapter 3 contains task descriptions. This means that tasks are identified by name, based (in this case) on the HSMS definition of task, and then the steps of the task are described in a logical sequence and include a good deal of detail.[2]

The work in task identification and description is done in a multi-stage process. HSMS job analysts work in teams. They first determine how many people and what titles they must cover to have access to every kind of work done in the department. In the case of the radiologic technologist, we found that there was some specialization such as between contrast studies and non-contrast "plain films," angiography, pediatrics, operating room radiography. With each "performer" interviewed, the analysts first obtain an idea of all the work covered by that individual. The analysts then apply the HSMS definition of task (discussed later in this chapter) to break the work down into specific task units, making sure that nothing is left out. This is the task identification stage. From this point the performers are interviewed and sometimes observed, and the analysts write descriptions of how the tasks are done, including contingencies, alternative approaches and emergencies. We interviewed as many performers as was necessary to cover all the work in the department, including radiologists, nurses, supervisors and physicists as well as technologists.

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[2] This differentiates the HSMS method from most other task analysis methods which simply identify tasks, usually with a vague definition, and include a very brief name. The HSMS method includes a specific definition of task. Once identified, a task has a code number, an abbreviated name, a summary statement of the task, and a full task description.

Simultaneously, we collected as much current literature as we could which in any way described the work of the department. This included articles in professional journals, text books, operators' manuals for equipment, current state and federal legislation,and proceedings of conferences dealing with safe practice and related issues of patient care. We also had informal talks with professionals, educators, and people in government agencies.

We completed the radiologists' medical tasks and nursing and administrative tasks first, and had them reviewed. We were then able to lay out the technologists' tasks with reference to the sequence of events as seen from a team perspective.

The literature and discussions provided an overview concerning certain steps and activities which should be represented in the task descriptions even if not always represented in current practice. These concern protection of the patient from unnecessary radiation, protection of the possible fetus, protection from contamination or contagion, sympathetic and dignified attention to the patient, and protection of staff from exposure to radiation. We call such objectives "desiderata."

The literature also provided information on alternative methods for carrying out tasks, contingencies to be taken account of, varieties of equipment available, and some indication of preferred practices. The radiologist tasks and the medical literature permitted us to develop tasks for the technologists that were not being done at the institutions where we were interviewing and/or are not described in detail in the literature on radiologic technology. There is little detailed material at the technologist level on pediatric radiography, angiography, the less common contrast studies, and the new technology of computerized transverse axial tomography. In the latter case we were fortunate to receive access to operators' manuals for the E.M.I. scanners and Pfizer's A.C.T.A. body scanner.

The task descriptions are first written by the HSMS analysts and then go to the HSMS Director for review and editing. At this stage the tasks are rewritten to incorporate the literature of the field and the desiderata. The task identifications are critically reviewed for conformity to the HSMS definition, and, when necessary, the analysts are sent back to the field to obtain additional information.

The next phase involves critical review by professionals other than the performers who were interviewed by the HSMS analysts.[3] Each of the tasks presented in Chapter 3 has had a minimum of three reviewers; most have been evaluated by five reviewers.

We were very fortunate to obtain as reviewers supervisory staff at Montefiore Hospital and radiologic technologists with national stature. As indicated in the acknowledgements, staff of the Bureau of Radiological

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[3] See the acknowledgements page at the beginning of this volume.

Health of FDA, the American Society of Radiologic Technologists,and the Joint Review Committee on Education in Radiologic Technology have given us the benefit of their expertise, as have educators and equipment manufacturers.

The reviewers are asked to evaluate the tasks for correctness of language and sequence of procedures, to note omission of any tasks in the specialty area, and to indicate acceptable alternative methods. Reviewers are asked to concentrate on how the tasks should be done and also to reflect national practice.

After the tasks are reviewed, the suggested changes are incorporated, additional tasks are collected and described when necessary, and any new or totally revised tasks are resubmitted for review as described here. When a task has been reviewed and revised as required by at least three reviewers, it is referred to as a "normative task," or an "N task," and is so marked.

Coverage

The reader will note that the collection of task descriptions is not like a sample survey. A sample survey would not cover all the work, but would cover only selected work. A sample would pick up the same work at many locations. We pick up and represent each unit of work only once. The reason is that our objective is to describe all approved work procedures for the purposes of developing instructional materials, curriculum objectives, and career ladders. For such purposes we want not just the most typical tasks; we want to cover the accepted but rare or difficult procedures, the emergencies, the contingencies, and the best possible practice. We are normative in approach as well as descriptive. We are not dealing with probability theory, which requires sampling of the "universe" being studied. We attempt to present the universe.

Most of the tasks in this volume were collected at Montefiore Hospital and Medical Center in New York City over the period August, 1972, to January, 1976. Montefiore Hospital is a respected major voluntary hospital. Tasks related to obstetrics and gynecology were collected at Mt. Sinai Hospital and Medical Center in New York City, another highly regarded voluntary hospital.

Alternative procedures and those not carried out at the hospitals where we collected our data were described based on our use of the literature, the radiologist tasks we developed, and the inputs of our reviewers. In several cases we eliminated practices described in the literature which are now considered to be dangerous, useless, or obsolete.

We include descriptions of some very new procedures involving computerized transverse axial tomography. To make our task descriptions more broadly based than the water-box brain scanner used at Montefiore, we used the literature on this new technology and the manuals to which we had access to write a general procedure task. Our reviewers were asked to evaluate the task for its generic usefulness.

Every effort was made to include every examination procedure carried out by radiologic technologists in hospital centers. However, procedures carried out only in specialized centers, such as some procedures in children's hospitals, or procedures using specialized equipment, such as for localization of foreign bodies in the eye, are not included. Our coverage implies that the work at small scale establishments, such as private offices and ambulatory care facilities, is covered.

Some tasks carried out by radiologic technologists are included even though the counterpart physician tasks do not exist in our data base. We did not collect physician tasks not done by radiologists, such as operating room radiography and retrograde pyelography, but we have the technologist tasks.

Since some of our radiologist tasks are controversial with respect to their danger or efficacy, we included the technologist's task only if we included the radiologist's task. Thus we include discography and spinal cord angiography, but we do not include pneumomediastinography.

This volume includes several tasks which are not strictly patient examinations. They cover quality review, teaching, or other activities which reflect and require the educational levels of the examination tasks.

Other tasks carried out by radiologic technologists seem more appropriate in a volume presenting the nursing, administrative, and equipment-related work of the department. Such tasks as first aid, record keeping, film processing, calibration, and equipment set-ups are in Volume

3. The use of the film badge to monitor personal exposure to radiation is in Volume 3. These decisions were based on general guidelines but were essentially arbitrary.

DESIDERATA

The radiologic technologist or educator reading these tasks will find that most include a wide range of options for such activities as positioning the patient or assisting the radiologist with surgical procedures or with equipment. The variety is offered to cover varying practices or a wide range of contingencies. We hope that the reader will find his or her experience represented and not be annoyed by the lengthy array of possibilities.

In other cases, however, we have consciously opted to include elements, steps, and whole tasks because they represent activities which are beneficial to the patient, the performer, or others on staff. These practices, or "desiderata," may not be in current practice in a given institution, but we include them to promote their usage and to help ensure the quality of work. Some of these are briefly referred to in this section.

We have the radiologic technologist review the x-ray requisition to check on the patient's condition, possible allergies, possible extensive cumulative exposure, or recent duplication of the present examination ordered. We have the technologist measure the patient before selecting technique. We have the performer check personally on possible pregnancy, and consider and supply appropriate shielding to the patient and to anyone to remain in the room during the exposure.

We have the performer collimate to the area of interest, not just to the size of the film. We have the performer consciously notice radiologists' preferences on contrast and density to avoid retakes.

We have the performer record exposure dosage when the institution provides and posts such information.

We have the performer consider what movement the patient is capable of; the performer arranges to have the patient attended, cleaned, and/or taken to the next location when appropriate. We always have the patient's identity verified.

We have the performer treat the patient with sympathy and dignity, and provide the patient with information about what is going on or will go on in the procedure.

USES OF THE TASK DESCRIPTIONS

This document is not intended to describe fully how to use these task descriptions. However, we offer a list of possible uses that will be dealt with in subsequent reports:

1. The task descriptions can be used as instructional materials in the classroom and in clinical training. They provide ordered, logical sequences of steps. They suggest what contingencies, options, and emergencies are associated with the tasks and, for the less familiar specialities, an indication of what is done in a given procedure.
2. The task descriptions can be used in the development of team training.
3. The task descriptions can provide an introduction to, or a basis for evaluation of, safe practice; they can be used to check on whether desired objectives are being accomplished.

4. The task descriptions, when combined with the HSMS skill and knowledge data, can become inputs in the development of performance-based curriculum objectives and educational ladders.

5. The task descriptions can be used as the basis for evaluation of work performance or as inputs to the development of job relevant proficiency tests (particularly for the selection of test content once the skill and knowledge data are collected).

6. The task descriptions can be used as objective references for the development of job descriptions, especially when edited to reflect the practices at a given institution.

7. The task descriptions can also be used in occupational counseling and for purposes of consumer education and protection.

THE HSMS DEFINITION OF TASK

In the HSMS view, each work activity needed to produce products, such as radiologic medical services, requires manpower which combines existing technology, knowledge, materials, and equipment with skills. The HSMS work unit is the "task." The HSMS definition of task is designed to result in the identification of a unit of work which can be moved from one job to another without disrupting other activities. The task is thus a unit of work which is smaller than a job as a whole, but large enough to have an identifiable, usable output.

The steps of the task, or elements, unlike the task, do not have an identifiable, usable output which can be independently consumed or used, or which can serve as an input in a further stage of production by an individual other than the performer. The HSMS task definition is as follows:

> A task is a series or set of work activities (elements) that are needed to produce an identifiable output that can be independently consumed or used, or that can be used as an input in a further stage of production by an individual who may or may not be the performer of the task.

In order to facilitate use of the definition, HSMS analysts use the following rules:

1. In principle, someone other than the performer of the task must be able to use or consume the output of the task.
2. Theoretically, it should be possible for there to be an elapse of time between tasks.
3. A task includes all the possible conditions or circumstances which a single performer is expected to deal with in connection with the production stage or the output involved.
4. A task includes all the elements that require continuous judgment or assessment by the same performer in order to assure the quality of the output.
5. A task includes all of the elements needed to produce an output which can be independently used or acted upon without special explanations to the next performer in the next stage of production.
6. A task includes all the elements needed to complete an output to a point at which another performer (who would continue with the next production sequence) would not have to redo any elements in order to continue.
7. A task includes all the elements needed to complete an output to a point at which another performer, in order to continue with the next stage of production, need not perform extra steps.
8. The task must not require that, for another performer to continue with the next stage in a production sequence, current institutional arrangements would have to be changed.
9. A task must be sufficiently broad in statement that it can be rated on its frequency of occurrence.

In identifying procedure tasks for the technologist, we found that there was not a one-to-one correspondence of radiologist tasks with technologist tasks. In some cases several radiologist procedures required the same essential steps and outputs on the part of the technologist. In the case of non-contrast "plain films," the tasks were divided by parts of the body,based on the likely areas to be called for on a given x-ray requisition. That is, upper and lower extremities are covered separately, and both upper and lower extremities are divided into more than one task each.

READING THE TASKS

The task descriptions in Chapter 3 follow the format presented in Figure 1, the HSMS Task Description Sheet. At the top right is the task's Code Number. A code number is assigned to the task which uniquely stands for the contents of the task, covering the task's output, what is used, the kind of recipient or respondent dealt with, and how the task is done. Regardless of the job title, institution, or industry in which the task is found, it will always have the same code number. The number itself has no intrinsic meaning.

The basic aspects of the task appear in items 1 through 4 on the left of page 1 of the Task Description Sheet. These help the analysts in the task identification stage and help differentiate one task from another. The term "output" is used to mean the result of an independent stage in a larger process of production in an institution, assuming the current organization of work activities. "What is used" in a task includes all

Figure 1. HSMS

TASK DESCRIPTION SHEET

Task Code No. _____

This is page 1 of ___ for this task.

1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

3. Is there a recipient, respondent or co-worker involved in the task? Yes...( ) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

List Elements Fully

6. Check here if this is a master sheet..( )

the things which the performer is expected to be able to use or choose from to produce the identified output.

The "recipient, respondent or co-worker" involved in a task reflects the special characteristics or condition of the people with which the performer must be trained to deal. For example, certain procedures are carried out in the same way for all patients. These are "any patient" tasks. In other cases, a procedure is different according to the age level of the patient. We can have a "pediatric task" and a different, "non-pediatric" task related to the same type of examination, and there are thus two tasks. In some cases the task is only applied to a given type of patient,such as "gravid female."

We assume that "pediatric" varies in its age cut-off reference as is appropriate to a given procedure. We use "non-infant" in cases where the cut-off between tasks groups children older than infants with the rest of the patient population. Most of the "plain film" examination tasks are differentiated as infant or non-infant tasks for the technologist.

The "name of the task" (item 5 on the Task Description Sheet), summarizes the task in a paragraph-length statement. The underlined portion of the statement is referred to as the "abbreviated task name." The latter is most useful for listings, while the extended name avoids ambiguity when tasks are listed for reference to their contents.

Under the Task Code Number the reader is told the number of pages that the task runs in the statement, "This is page ___ of ___ for this task." All the tasks bear the notation "OK-RP;RR;RR" and are checked as master sheets on the lower right of the first page. This indicates that the task has had the required minimum of three reviewers and is a "normative" task.[4]

The description of how the task is done begins with the column on the right on the first Task Description Sheet and continues for as many pages as necessary on "continuation sheets."

As the work progressed, we developed certain language conventions of which the reader should be aware for ease of comprehension. These are briefly described as follows:

1. The person doing the task is always referred to as the "performer" regardless of his or her usual job title or rank. This provides a standard format and leaves for a later stage any battles over who should do what.[5]
2. The task always begins with an initiating element that indicates how it comes about that the performer is doing the task.
3. The same or similar activities tend to be described with similar language wherever these appear to assist analysts in spotting elements that overlap from task to task. This facilitates curriculum development even if it makes for dull reading.

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[4] RP stands for resource person, i.e., the in-house reviwer; RR stands for resource respondent, i.e., outside reviewer. In actual practice, these merely show three reviewers; additional reviewers are not recorded on the sheet.

[5] We have come across individuals who bristle at being referred to as "performer" rather than a formal title. No disrespect is meant, and we ask the reader to indulge us in this.

4. Each task is written so that it is complete within itself. Therefore, there is repetition from task to task.

5. Certain phrases should be interpreted by the reader to indicate that another task has been generated by virtue of this task. Phrases such as "performer arranges...," "performer has...[done]" are examples.

6. When a task may either be done by the performer or delegated, a separate task is generated. The signal for such tasks are phrases such as "...or decides to do personally," "performer plans to....," or "performer may decide to...."

7. When a particular part of a task represents an element that may or may not be done depending on institutional practice, personal preference, the state of the art, or the patient's condition, we use the phrase "performer may" or "may" before the description. Where the performer *must* make a choice as part of the task we have tried to make that explicit: "performer decides," "performer considers whether."

8. The specific content of some steps in a task, such as positions, angles, immobilization equipment to be used may vary as the state of knowledge in the field changes or new technology develops. There may be variations which reflect the condition of the patient, institutional facilities, or what was already done. We do not attempt to resolve these problems; we simply acknowledge them. Thus, the reader will find the phrase "as appropriate" in many steps. The phrase is used to cover these contingencies. We leave it to the instructor to select what is "true" or "correct" at any point in time.

9. We have attempted to use the terms "projection," "position" and "view" consistently for all the tasks. We use *position* to designate the placement or manipulation of a patient in relation to the x-ray beam source and film. A *projection* describes the direction and sequence in which the x-ray beam enters the patient's body and then exits to impinge on the film. The *position and projection are the same* with respect to placement. This is, an anterior-posterior (AP) projection enters the front of the patient and passes through the back to the film. The AP position results in an AP projection. A *view* describes the image of the part as projected on the film, and is therefore the reverse of the projection. That is, the AP projection produces a postero-anterior (PA) view.

Note

The reader should be aware that, though the tasks in Chapter 3 are presented in numerical order by code number, not every number is represented. The first code number is Code 7; the last is Code 526. There are only 76 tasks in Chapter 3. The reason is that the code numbers are assigned in sequence as the tasks are processed, and the other tasks appear in other volumes or reports.

CHAPTER 2

LISTING OF ABBREVIATED TASK NAMES BY CATEGORY AND CODE NUMBER

TASKS LISTED BY SYSTEM OR AREA OF THE BODY

Category and Abbreviated Task Name	Task Code No.
CIRCULATORY SYSTEM	
Blood	
Taking peripheral angiograms of any patient (after percutaneous needle or catheter entry, translumbar puncture, ascending or descending venous entry).	510
Taking catheter thoracic and/or abdominal aortograms of any patient, and/or selective visceral arteriograms (bronchial or abdominal).	511
Taking selective pelvic angiograms of non-pediatric gravid or nongravid female patient.	512
Taking intravenous angiocardiograms of any patient.	513
Taking selective thyroid angiograms of any patient.	514
Taking catheter inferior vena cavograms and/or renal or adrenal venograms of non-infant patient.	515
Taking percutaneous splenoportograms of any patient.	516
Taking selective subclavian arteriograms of non-pediatric patient for thoracic outlet syndrome evaluation.	517
Taking selective pulmonary angiograms or selective angiocardiograms of any patient.	518
Taking percutaneous coronary arteriograms and/or left ventriculograms of any patient.	519

TASKS LISTED BY SYSTEM OR AREA OF THE BODY (continued)

Category and Abbreviated Task Name	Task Code No.
CIRCULATORY SYSTEM	
Lymph	
Taking lymphangiograms or lymphadenograms of any patient.	376
DIGESTIVE SYSTEM AND ABDOMEN	
Salivary Glands	
Taking sialograms of any patient.	375
Abdominal Contents	
Taking plain film radiographs of abdominal contents of non-infant patient.	363
Taking plain film radiographs of abdomen of infant patient.	495
Gastrointestinal and Biliary Tracts	
Taking upper GI radiographs of non-pediatric patient.	381
Taking upper GI radiographs of pediatric patient.	499
Taking small intestine intubation radiographs of a non-pediatric patient.	382

TASKS LISTED BY SYSTEM OR AREA OF THE BODY (continued)

Category and Abbreviated Task Name	Task Code No.
DIGESTIVE SYSTEM AND ABDOMEN	
Gastrointestinal and Biliary Tracts (continued)	
Taking barium enema radiographs of non-pediatric patient.	383
Taking barium enema, intussusception or defecography radiographs of pediatric patient.	500
Taking oral cholecystograms and cholangiograms of non-infant patient.	384
Taking intravenous cholangiograms and cholecystograms of non-infant patient.	385
Taking percutaneous or T-tube cholangiograms of non-infant patient.	386
Taking operative cholangiograms, pancreatograms or similar operative radiographs of any patient.	371
MUSCULO-SKELETAL SYSTEM AND CHEST	
Taking plain film radiographs of the skull and/or face of non-infant patient.	365
Taking plain film radiographs of the paranasal sinuses of a non-infant patient.	366
Taking plain film radiographs of the skull of infant patient.	491
Taking preliminary localization radiographs of foreign bodies in orbit or eye of non-infant patient.	367
Providing technical assistance for laryngography or cleft palate study of any patient (or any similar fluoroscopic examination including spot filming and/or cineradiography).	380

TASKS LISTED BY SYSTEM OR AREA OF THE BODY (continued)

Category and Abbreviated Task Name	Task Code No.
MUSCULO-SKELETAL SYSTEM AND CHEST (continued)	
Taking plain film radiographs of vertebral column of non-infant patient.	361
Taking plain film radiographs of vertebral column of infant patient.	492
Taking plain film radiographs of fingers, hand(s) or wrist(s) of non-infant patient.	355
Taking plain film radiographs of forearm and/or elbow joint of non-infant patient.	356
Taking plain film radiographs of humerus and/or shoulder girdle of non-infant patient.	357
Taking plain film radiographs of the upper extremities of infant patient.	493
Taking plain film radiographs of toes, foot and/or ankle joint of non-pediatric patient.	358
Taking plain film radiographs of leg(s), knee(s) and/or femur(s) of non-infant patient.	359
Taking plain film radiographs of the lower extremities of infant or pediatric patient.	496
Taking positive contrast arthrograms (especially of knee) of any patient.	377
Taking plain film radiographs of sternum, ribs and/or thoracic viscera of non-infant patient.	362
Taking radiographs of neck, chest of infant patient.	494
Taking plain film radiographs of pelvis, hips and/or upper femora of non-infant patient.	360
Taking operative orthopedic radiographs of any patient (such as in hip pinning).	370

TASKS LISTED BY SYSTEM OR AREA OF THE BODY (continued)

Category and Abbreviated Task Name	Task Code No.
NERVOUS SYSTEM	
Taking cerebral angiograms or venograms of any patient.	504
Taking pneumoencephalograms or brain ventriculograms of any patient.	505
Taking positive contrast spinal or posterior fossa myelograms of any patient.	506
Taking diskograms of any patient.	507
Taking air or gas contrast myelograms of any patient.	508
Taking spinal cord angiograms of any patient.	509
REPRODUCTIVE AND URINARY SYSTEMS	
Breasts	
Taking mammograms (radiography or xeroradiography) of non-infant patient.	368
Reproductive System and Fetus	
Taking pelvic pneumograms and/or hysterosalpingograms of non-pediatric female patient.	465
Taking radiographs of a pregnant patient's abdomen for fetography, amniography, placentography.	466
Taking radiographs of a pregnant patient's uterus for intra-uterine transfusion.	467
Taking radiographs of a pregnant patient's pelvis for Colcher-Sussman pelvimetry.	468

TASKS LISTED BY SYSTEM OR AREA OF THE BODY (continued)

Category and Abbreviated Task Name	Task Code No.
REPRODUCTIVE AND URINARY SYSTEMS	
Urinary System, Peritoneum	
Taking intravenous pyelograms and urograms of non-pediatric patient.	387
Taking excretory intravenous inferior vena cavograms and urograms of pediatric patient.	502
Taking infusion nephrotomograms of any patient.	388
Taking percutaneous antegrade or renal cyst pyelograms of non-infant patient.	389
Taking cystograms and voiding cystourethrograms of any patient.	390
Taking retrograde pyelograms and ureterograms of non-pediatric patient.	463
Taking percutaneous peritoneograms/herniograms of pediatric patient.	501
RESPIRATORY SYSTEM	
Taking radiographs for choanal atresia study of infant patient.	497
Taking radiographs of anterior portion of the neck of non-infant patient.	364
Taking bronchograms of a non-pediatric patient.	378
Taking bronchograms of a pediatric patient.	498
Carrying out radiologic technology for bronchoscopy of needle lung biopsy of a non-pediatric patient.	379

TASKS LISTED BY SYSTEM OR AREA OF THE BODY (continued)

Category and Abbreviated Task Name	Task Code No.
GENERAL TASKS n.e.c.*	
Taking genitograms or fistulograms of any patient for intersex, external fistula or sinus tract examination.	503
Taking intravisceral or isolated operating room radiographs of any patient.	372
Taking operating room radiographs for opaque foreign body search.	373
Providing technical assistance for an examination of any patient requiring fluoroscopic control and spot filming.	464
Preparing, transporting, setting up and returning mobile portable radiography equipment for bedside radiography.	369
Providing technical quality review of "plain film" radiographs.	81
Tomography n.e.c.	
Taking tomograms of non-infant patient.	374
Taking computerized transverse axial tomographic (C.T.T.) scans of any patient.	526
Meetings, Teaching n.e.c.	
Participating in meeting of diagnostic x-ray department technologists.	353
Providing clinical training for radiologic technologists or students in radiographic technology.	82
Observing and evaluating work of radiologic technologists or students in diagnostic radiography, and deciding whether training is needed.	7

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* n.e.c.: not elsewhere classified.

TASKS LISTED BY TASK FUNCTION

Category and Abbreviated Task Name	Task Code No.
"PLAIN FILM" EXAMINATIONS	
Non-Contrast Studies	
Taking plain film radiographs of fingers, hand(s) or wrist(s) of non-infant patient.	355
Taking plain film radiographs of forearm and/or elbow joint of non-infant patient.	356
Taking plain film radiographs of humerus and/or shoulder girdle of non-infant patient.	357
Taking plain film radiographs of the upper extremities of infant patient.	493
Taking plain film radiographs of the skull and/or face of non-infant patient.	365
Taking plain film radiographs of the paranasal sinuses of a non-infant patient.	366
Taking preliminary localization radiographs of foreign bodies in orbit or eye of non-infant patient.	367
Taking plain film radiographs of the skull of infant patient.	491
Taking plain film radiographs of vertebral column of non-infant patient.	361
Taking plain film radiographs of vertebral column of infant patient.	492
Taking plain film radiographs of abdominal contents of non-infant patient.	363
Taking plain film radiographs of abdomen of infant patient.	495
Taking plain film radiographs of toes, foot and/or ankle joint of non-pediatric patient.	358

TASKS LISTED BY TASK FUNCTION (continued)

Category and Abbreviated Task Name	Task Code No.
"PLAIN FILM" EXAMINATIONS	
Non-Contrast Studies (continued)	
Taking plain film radiographs of leg(s), knee(s) and/or femur(s) of non-infant patient.	359
Taking plain film radiographs of pelvis, hips and/or upper femora of non-infant patient.	360
Taking plain film radiographs of the lower extremities of infant or pediatric patient.	496
Routine Contrast Studies	
Taking radiographs of neck, chest of infant patient.	494
Taking radiographs of anterior portion of the neck of non-infant patient.	364
Taking plain film radiographs of sternum, ribs and/or thoracic viscera of non-infant patient.	362
Specialized "Plain Film" Studies	
Taking mammograms (radiography or xeroradiography) of non-infant patient.	368
Taking tomograms of non-infant patient.	374
Taking radiographs of a pregnant patient's pelvis for Colcher-Sussman pelvimetry.	468
Taking operative orthopedic radiographs of any patient (such as in hip pinning).	370

TASKS LISTED BY TASK FUNCTION (continued)

Category and Abbreviated Task Name	Task Code No.
"PLAIN FILM" EXAMINATIONS	
Specialized "Plain Film" Studies (continued)	
Taking operative cholangiograms, pancreatograms or similar operative radiographs of any patient.	371
Taking intravisceral or isolated operating room radiographs of any patient.	372
Taking operating room radiographs for opaque foreign body search.	373
CONTRAST EXAMINATIONS	
Angiography	
Taking lymphangiograms or lymphadenograms of any patient.	376
Taking cerebral angiograms or venograms of any patient.	504
Taking spinal cord angiograms of any patient.	509
Taking peripheral angiograms of any patient (after percutaneous needle or catheter entry, translumbar puncture, ascending or descending venous entry).	510
Taking catheter thoracic and/or abdominal aortograms of any patient, and/or selective visceral arteriograms (bronchial or abdominal).	511
Taking selective pelvic angiograms of non-pediatric gravid or nongravid female patient.	512
Taking intravenous angiocardiograms of any patient.	513
Taking selective thyroid angiograms of any patient.	514
Taking catheter inferior vena cavograms and/or renal or adrenal venograms of non-infant patient.	515

TASK LISTED BY TASK FUNCTION (continued)

Category and Abbreviated Task Name	Task Code No.
CONTRAST EXAMINATIONS	
Angiography (continued)	
Taking percutaneous splenoportograms of any patient.	516
Taking selective subclavian arteriograms of non-pediatric patient for thoracic outlet syndrome evaluation.	517
Taking selective pulmonary angiograms or selective angiocardiograms of any patient.	518
Taking percutaneous coronary arteriograms and/or left ventriculograms of any patient.	519
Neuro-Skull Studies, Myelography, Diskography	
Taking pneumoencephalograms or brain ventriculograms of any patient.	505
Taking positive contrast spinal or posterior fossa myelograms of any patient.	506
Taking air or gas contrast myelograms of any patient.	508
Taking diskograms of any patient.	507
Intravenous Injection or Infusion Studies	
Taking intravenous cholangiograms and cholecystograms of non-infant patient.	385
Taking intravenous pyelograms and urograms of non-pediatric patient.	387
Taking infusion nephrotomograms of any patient.	388

Category and Abbreviated Task Name	Task Code No.
CONTRAST EXAMINATIONS	
Intravenous Injection or Infusion Studies (continued)	
Taking excretory intravenous inferior vena cavograms and urograms of pediatric patient.	502
Taking computerized transverse axial tomographic (C.T.T.) scans of any patient.	526
Studies with Oral Ingestion of Contrast	
Taking upper GI radiographs of non-pediatric patient.	381
Taking upper GI radiographs of pediatric patient.	499
Taking oral cholecystograms and cholangiograms of non-infant patient.	384
Instillation, Intubation, Enema Studies	
Taking sialograms of any patient.	375
Taking radiographs for choanal atresia study of infant patient.	497
Providing technical assistance for laryngography or cleft palate study of any patient (or any similar fluoroscopic examination including spot filming and/or cineradiography).	380
Taking bronchograms of a non-pediatric patient.	378
Taking bronchograms of a pediatric patient.	498
Taking small intestine intubation radiographs of a non-pediatric patient.	382
Taking percutaneous or T-tube cholangiograms of non-infant patient.	386

TASKS LISTED BY TASK FUNCTION (continued)

Category and Abbreviated Task Name	Task Code No.

CONTRAST EXAMINATIONS

Instillation, Intubation, Enema Studies (continued)

Category and Abbreviated Task Name	Task Code No.
Taking retrograde pyelograms and ureterograms of non-pediatric patient.	463
Taking cystograms and voiding cystourethrograms of any patient.	390
Taking pelvic pneumograms and/or hysterosalpingograms of non-pediatric female patient.	465
Taking genitograms or fistulograms of any patient for intersex, external fistula or sinus tract examination.	503
Taking barium enema radiographs of non-pediatric patient.	383
Taking barium enema, intussusception or defecography radiographs of pediatric patient.	500

Direct Puncture or Injection Studies

Category and Abbreviated Task Name	Task Code No.
Taking positive contrast arthrograms (especially of knee) of any patient.	377
Carrying out radiologic technology for bronchoscopy or needle lung biopsy of a non-pediatric patient.	379
Taking percutaneous antegrade or renal cyst pyelograms of non-infant patient.	389
Taking radiographs of a pregnant patient's abdomen for fetography, amniography, placentography.	466
Taking radiographs of a pregnant patient's uterus for intrauterine transfusion.	467
Taking percutaneous peritoneograms/herniograms of pediatric patient.	501

TASKS LISTED BY TASK FUNCTION (continued)

Category and Abbreviated Task Name	Task Code No.
EXAMINATIONS AND USE OF EQUIPMENT n.e.c.	
Providing technical assistance for an examination of any patient requiring fluoroscopic control and spot filming.	464
Preparing, transporting, setting up and returning mobile portable radiography equipment for bedside radiography.	369
EVALUATION, TEACHING, MEETINGS TASKS	
Providing technical quality review of "plain film" radiographs.	81
Observing and evaluating work of radiologic technologists or students in diagnostic radiography, and deciding whether training is needed.	7
Providing clinical training for radiologic technologists or students in radiographic technology.	82
Participating in meeting of diagnostic x-ray department technologists.	353

TASKS LISTED BY TYPE OF MAIN RECIPIENT, RESPONDENT OR CO-WORKER

Category and Abbreviated Task Name	Task Code No.
TASKS WITH PATIENT RECIPIENT	
Any Patient	
Taking sialograms of any patient.	375
Taking positive contrast arthrograms (especially of knee) of any patient.	377
Taking infusion nephrotomograms of any patient.	388
Taking cystograms and voiding cystourethrograms of any patient.	390
Taking genitograms or fistulograms of any patient for intersex, external fistula or sinus tract examination.	503
Taking lymphangiograms or lymphadenograms of any patient.	376
Taking pneumoencephalograms or brain ventriculograms of any patient.	505
Taking positive contrast spinal or posterior fossa myelograms of any patient.	506
Taking diskograms of any patient.	507
Taking air or gas contrast myelograms of any patient.	508
Taking cerebral angiograms or venograms of any patient.	504
Taking spinal cord angiograms of any patient.	509
Taking peripheral angiograms of any patient (after percutaneous needle or catheter entry, translumbar puncture, ascending or descending venous entry).	510
Taking catheter thoracic and/or abdominal aortograms of any patient, and/or selective visceral arteriograms (bronchial or abdominal).	511
Taking intravenous angiocardiograms of any patient.	513

TASKS LISTED BY TYPE OF MAIN RECIPIENT, RESPONDENT OR CO-WORKER (continued)

Category and Abbreviated Task Name	Task Code No.
TASKS WITH PATIENT RECIPIENT	
Any Patient (continued)	
Taking selective thyroid angiograms of any patient.	514
Taking percutaneous splenoportograms of any patient.	516
Taking selective pulmonary angiograms or selective angiocardiograms of any patient.	518
Taking percutaneous coronary arteriograms and/or left ventriculograms of any patient.	519
Taking operative orthopedic radiographs of any patient (such as in hip pinning).	370
Taking operative cholangiograms, pancreatograms or similar operative radiographs of any patient.	371
Taking intravisceral or isolated operating room radiographs of any patient.	372
Taking operating room radiographs for opaque foreign body search.	373
Taking computerized transverse axial tomographic (C.T.T.) scans of any patient.	526
Providing technical assistance for laryngography or cleft palate study of any patient (or any similar fluoroscopic examination including spot filming and/or cineradiography).	380
Providing technical assistance for an examination of any patient requiring fluoroscopic control and spot filming.	464
Any Non-Infant Patient	
Taking plain film radiographs of fingers, hand(s) or wrist(s) of non-infant patient.	355

TASKS LISTED BY TYPE OF MAIN RECIPIENT, RESPONDENT OR CO-WORKER (continued)

Category and Abbreviated Task Name	Task Code No.
TASKS WITH PATIENT RECIPIENT	
Any Non-Infant Patient (continued)	
Taking plain film radiographs of forearm and/or elbow joint of non-infant patient.	356
Taking plain film radiographs of the skull and/or face of non-infant patient.	365
Taking plain film radiographs of the paranasal sinuses of a non-infant patient.	366
Taking preliminary localization radiographs of foreign bodies in orbit or eye of non-infant patient.	367
Taking radiographs of anterior portion of the neck of non-infant patient.	364
Taking plain film radiographs of vertebral column of non-infant patient.	361
Taking plain film radiographs of humerus and/or shoulder girdle of non-infant patient.	357
Taking plain film radiographs of sternum, ribs and/or thoracic viscera of non-infant patient.	362
Taking mammograms (radiography or xeroradiography) of non-infant patient.	368
Taking plain film radiographs of abdominal contents of non-infant patient.	363
Taking oral cholecystograms and cholangiograms of non-infant patient.	384
Taking intravenous cholangiograms and cholecystograms of non-infant patient.	385
Taking percutaneous or T-tube cholangiograms of non-infant patient.	386

TASKS LISTED BY TYPE OF MAIN RECIPIENT, RESPONDENT OR CO-WORKER (continued)

Category and Abbreviated Task Name	Task Code No.
TASKS WITH PATIENT RECIPIENT	
Any Non-Infant Patient (continued)	
Taking percutaneous antegrade or renal cyst pyelograms of non-infant patient.	389
Taking catheter inferior vena cavograms and/or renal or adrenal venograms of non-infant patient.	515
Taking plain film radiographs of pelvis, hips and/or upper femora of non-infant patient.	360
Taking plain film radiographs of leg(s), knee(s) and/or femur(s) of non-infant patient.	359
Taking tomograms of non-infant patient.	374
Any Non-Pediatric Patient	
Taking selective subclavian arteriograms of non-pediatric patient for thoracic outlet syndrome evaluation.	517
Taking bronchograms of a non-pediatric patient.	378
Carrying out radiologic technology for bronchoscopy or needle lung biopsy of a non-pediatric patient.	379
Taking upper GI radiographs of non-pediatric patient.	381
Taking small intestine intubation radiographs of a non-pediatric patient.	382
Taking barium enema radiographs of non-pediatric patient.	383
Taking intravenous pyelograms and urograms of non-pediatric patient.	387
Taking retrograde pyelograms and ureterograms of non-pediatric patient.	463

TASKS LISTED BY TYPE OF MAIN RECIPIENT, RESPONDENT OR CO-WORKER (continued)

Category and Abbreviated Task Name	Task Code No.
TASKS WITH PATIENT RECIPIENT	
Any Non-Pediatric Patient (continued)	
Taking plain film radiographs of toes, foot and/or ankle joint of non-pediatric patient.	358
Non-Pediatric Female Patient	
Taking pelvic pneumograms and/or hysterosalpingograms of non-pediatric female patient.	465
Taking radiographs of a pregnant patient's abdomen for fetography, amniography, placentography.	466
Taking radiographs of a pregnant patient's uterus for intra-uterine transfusion.	467
Taking radiographs of a pregnant patient's pelvis for Colcher-Sussman pelvimetry.	468
Taking selective pelvic angiograms of non-pediatric gravid or nongravid female patient.	512
Infant Patient	
Taking plain film radiographs of the upper extremities of infant patient.	493
Taking plain film radiographs of the skull of infant patient.	491
Taking radiographs for choanal atresia study of infant patient.	497
Taking radiographs of neck, chest of infant patient.	494
Taking plain film radiographs of vertebral column of infant patient.	492

TASKS LISTED BY TYPE OF MAIN RECIPIENT, RESPONDENT OR CO-WORKER (continued)

Category and Abbreviated Task Name	Task Code No.
TASKS WITH PATIENT RECIPIENT	
Infant Patient (continued)	
Taking plain film radiographs of abdomen of infant patient.	495
Taking plain film radiographs of the lower extremities of infant or pediatric patient.	496
Pediatric Patient	
Taking bronchograms of a pediatric patient.	498
Taking upper GI radiographs of pediatric patient.	499
Taking percutaneous peritoneograms/herniograms of pediatric patient.	501
Taking excretory intravenous inferior vena cavograms and urograms of pediatric patient.	502
Taking barium enema, intussusception or defecography radiographs of pediatric patient.	500
TASKS WITH CO-WORKERS, STUDENTS OR OTHER MAIN RECIPIENTS	
Participating in meeting of diagnostic x-ray department technologists.	353
Preparing, transporting, setting up and returning mobile portable radiography equipment for bedside radiography.	369
Providing technical quality review of "plain film" radiographs.	81

TASKS LISTED BY TYPE OF MAIN RECIPIENT, RESPONDENT OR CO-WORKER (continued)

Category and Abbreviated Task Name	Task Code No.
TASKS WITH CO-WORKERS, STUDENTS OR OTHER MAIN RECIPIENTS (continued)	
Observing and evaluating work of radiologic technologists or students in diagnostic radiography, and deciding whether training is needed.	7
Providing clinical training for radiologic technologists or students in radiographic technology.	82

CHAPTER 3

TASK DESCRIPTIONS:

RADIOLOGIC TECHNOLOGIST PATIENT PROCEDURES

There are 76 tasks included in this chapter. These are arranged numerically by Task Code Number from Code 7 to Code 526. Part I covers tasks 7 through 386; Part II covers tasks 387 through 526. Please note that not all tasks with code numbers between 7 and 386 are represented in Part I of this volume.

There is no chapter pagination. Instead, the pages within each task are numbered. The user can find the task by referring to the Task Code Number and task page number at the upper right of each page.

Some tasks have a notation at the bottom of the first sheet which states, "This is a new assignment to this number." This indicates that an earlier use was made of the number, and the earlier assignment is now obsolete. All other code numbers in this volume up to code 273 are tasks that were also found by HSMS in an ambulatory care center where a pilot test of the HSMS method was carried out.

TASK DESCRIPTION SHEET

Task Code No. 7

This is page 1 of 2 for this task.

1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Radiologic technologist's or student's work in radiographic procedures observed, evaluated, interrupted if necessary; evaluation and need for training noted and/or reported; permission asked to teach or have teaching done.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pen; paper; equipment used in diagnostic radiographic procedures

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Radiologic technologists or rad. tech. students (in diagnostic radiography); supervisors; any patients involved

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Observing and evaluating work of radiologic technologists or students in diagnostic radiography, and deciding whether training is needed by observing, evaluating; comparing with performance standards; deciding whether training is needed; interrupting task and/or reporting or noting conclusions; asking to teach or that individual be taught in deficient areas.

List Elements Fully

Performer observes the work of radiologic technologists, dark room aides and/or students in diagnostic radiographic procedures, film processing, and related procedures, including use of related equipment, and decides if additional training is needed.

1. If appropriate, reviews relevant performance standards of work to be observed.

2. Performer observes work of radiologic technologists, dark room aides, or students:

   a. While working with the person being observed.
   b. While supervising the person.
   c. While performing administrative functions.
   d. At the request of staff person or student, or at request of supervisor of staff person or student.
   e. As part of informal spot check procedure.

3. Performer explains own presence to any patients involved, if appropriate, while observing.

4. Performer notes how the person is carrying out the work assignment(s) involved. Compares with relevant performance standards.

   a. Decides whether the activity is being done properly.

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

TASK DESCRIPTION SHEET (continued)

Task Code No. 7

This is page 2 of 2 for this task.

List Elements Fully	List Elements Fully
b. Considers whether there is a need to demonstrate the procedure and/or explain the proper approach, technique, attitude, or theory involved. c. Decides whether to interrupt procedure and take over. (If so, performer does the interrupted procedure as a regular task.) d. Performer may note whether performance standards should be made clearer or more specific in curriculum or clinical training. Notes as appropriate. e. Performer makes written or mental note of evaluation as appropriate. 5. If performer decides that further training is needed, performer may decide: a. To teach the staff person or student at that point or explain how to improve. b. To explain to person's supervisor that training is needed and request permission to teach or ask that teaching be provided.	

TASK DESCRIPTION SHEET

Task Code No. 81

This is page 1 of 4 for this task.

1. **What is the output of this task?** (Be sure this is broad enough to be repeatable.)

Decision made on completeness and quality of "plain film" radiographs; radiologist called to see scouts, wet readings, radiographs of doubtful quality, or those showing emergency signs; instructions written on views missing or "retakes" needed; needed equipment adjustment, pt. repositioning recorded; supervisor informed of problems with equipment or technologist; desk or radiological technologist informed when full set approved; approved radiographs placed for jacketing, delivery or use.

2. **What is used in performing this task?** (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Processed "plain film" radiographs; x-ray requisition sheets; view boxes; automatic x-ray film processor; phone; pen or pencil; charts listing standard views for x-ray examinations; wax marking pen

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Radiologic technologists; supervisor of technologists; radiologist

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Providing technical quality review of "plain film" radiographs by reviewing requisition; arranging and viewing radiographs; checking completeness and assessing diagnostic quality; deciding to order additional views and/or retakes for medical reasons only; determining reasons for inadequate radiographs; recording views missing or retakes and adjustments needed; discussing and/or reporting problems with technologists and/or equipment in obtaining quality; notifying and/or consulting radiologist on emergency signs; placing approved films for jacketing or use.

List Elements Fully

Performer assesses the technical quality of "plain film" radiographs (radiographs made without the use of special equipment or contrast media) as a result of:

a. Assignment to review own work.
b. Assignment to review all such radiographs as processed.
c. Request of co-worker for opinion.

The plain films may be radiographic studies of the upper and lower extremities, shoulder girdle, pelvis and hips, vertebral column, sternum, ribs, thoracic viscera, abdominal contents, skull, paranasal sinuses and orbit or eye.

1. Performer obtains a patient's radiograph(s) and requisition sheet as follows:

   a. Performer collects radiographs as they emerge from automatic processor. Places on view boxes and arranges those for a given patient by noting name and/or ID number marked on radiograph.
   Performer may be asked to view a set of radiographs by co-worker; or performer may obtain a set which were taken by performer.
   b. Performer obtains x-ray requisition sheet, or co-worker brings it to performer.

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

TASK DESCRIPTION SHEET (continued)

Task Code No. 81

This is page 2 of 4 for this task.

List Elements Fully

2. Performer reads the requisition sheet to determine the examination called for, purpose, the patient involved, special considerations, and to check which views are called for:

   a. Performer checks the examinations called for, purpose, parts involved, side of interest and affected areas, whether bilateral or unilateral views are requested, the patient positions and views ordered, number of exposures, central beam angulation and the parts to be included. May consult chart listing standard views. Notes whether orders include bilateral views on a single film, whether the use of a grid or bucky was to be involved. Notes any request for magnification. Checks the name of the referring physician.
   b. Performer reads patient's name, identification number, sex, age, and size. Notes whether patient is in-patient, out-patient, accident, or emergency patient. Notes whether films are to demonstrate air or fluid levels, foreign body, tumor mass, calcifications or fractures, as appropriate.
   c. Performer notes whether standard and/or special views have been omitted, ordered or approved to accommodate patient's condition and/or the nature of the suspected pathology.
   d. Places radiograph(s) on viewing box, in proper sequence as appropriate.
   e. If requisition sheet calls for wet reading or calls for scout (preliminary) films, performer attaches requisition form to radiograph(s) and calls the appropriate resident or radiologist from the immediate area (by phone). Indicates that the radiograph(s) are ready.

3. Performer assesses the plain film radiographs for quality and completeness based on purpose and type of study:

List Elements Fully

   a. Performer checks that all the special views ordered are present and/or that all the standard views for the examination are present. Notes which views are missing.
      i) Performer may note missing views and/or discuss with technologist to determine whether missing views were made but not identified, lost, forgotten, or were omitted because of contraindications in positioning patient. May note reasons already listed on requisition sheet.
      ii) Performer may help co-worker technologist locate missing or unidentified radiographs.
      iii) May suggest alternative patient or tube positioning to obtain views for which conventional positioning is contraindicated.
      iv) May record views still needed for completion of examination.

   b. Performer checks that all radiographs show proper R-L identification, patient identification, and other required information. If film is not fully identified, informs technologist or radiologist and helps determine which side is right and/or left, and other needed information. Writes on film with wax marker. Does not order "retakes" unless radiologist decides the additional exposure is necessary.
   c. For each radiograph performer assesses whether the correct patient positioning and the full area of interest is demonstrated, whether a needlessly large area has been exposed, and/or whether this is visual evidence of proper field size collimation (i.e. a "border" around the view, showing the collimated field size and/or evidence of appropriate shielding).

TASK DESCRIPTION SHEET (continued)

Task Code No. 81

This is page 3 of 4 for this task.

List Elements Fully

i) If the area of interest is "cut off" performer notes whether two radiographs were taken to represent the view. If not, performer records and recommends a "retake" with proper collimation to the field of interest or an additional view to demonstrate the area that was cut off, collimated to obtain only the missing area. Suggests further radiography only to provide missing information, and so as to require as little further exposure of the patient as possible.

ii) If there is no border around the radiograph(which indicates proper collimation),or if the area demonstrated is needlessly large in relation to the area of interest, performer indicates this to technologist (or notes for own instruction if evaluating own radiographs). Indicates the dangers to the patient of unnecessary exposure. May record.

iii) If a patient position called for has not been correctly obtained, thus not providing the required view, performer may consult with supervisor or radiologist. Indicates need for a "retake" only if the information required is needed for medical reasons. Performer may explain or record the proper patient or tube positioning and angulation needed to obtain the view ordered so that retake will be correct.

d. Performer evaluates each radiograph to determine whether there is adequate detail and definition to provide the medical information called for. Assesses whether there is too much blurring, distortion; whether density is adequate and contrast sufficient to provide proper diagnostic quality. Notes whether there are artifacts which interfere with the image.

List Elements Fully

i) Performer considers the purpose of the study and the preferences of the radiologist (if known).

ii) If performer finds blurring, distortion, excessive or inadequate density, insufficient or excessive contrast,and/or artifacts in the area of interest, performer considers whether a "retake" should be made. May ask opinion of supervisor or radiologist. Indicates need for a retake only for medical reasons so as to minimize exposure of patient. Records.

iii) If performer decides that the radiograph does not provide proper diagnostic quality, performer considers what factors may have contributed, such as improper immobilization of patient, inappropriate technical factors (or failure to adjust for special circumstances such as obesity), improper part-film distance, focal-film distance, or failure to adjust exposure factors for a change in such distances.

Considers possible problems with x-ray or processing equipment. Performer may draw on experience with the equipment involved to assess what is wrong. If regular assignment, performer maintains an awareness of the equipment output so as to be able to spot or trace accumulation of signs indicating equipment malfunction.

e. If performer has questions about the quality of any radiographs, asks available resident or radiologist to assist in deciding whether the radiograph(s) are adequate for interpretation.

TASK DESCRIPTION SHEET (continued)

Task Code No. 81

This is page 4 of 4 for this task.

List Elements Fully

f. The performer may consider whether the appearance of radiograph(s), suggests a condition in the patient which warrants immediate attention. If so, notifies an available resident or radiologist at once.

g. Depending on institutional procedures, performer may suggest additional views to obtain more complete information for the radiologist's needs in interpreting. Considers the quality of the existing radiographs, including areas that appear suspicious. Draws on appearance of radiographs for signs of pathological conditions.

4. If the performer has judged that the technical quality of any of the radiograph(s) is not adequate, considers whether this is due to technologist's performance, malfunctioning of x-ray or processing equipment, or a combination of reasons.

   a. If the performer decides that the technical quality of the radiograph(s) is inadequate due to the technologist's performance, performer considers what technologist should have done or must do to correct or adjust technical factors or reposition patient.

      i) If reviewing own work, performer makes mental note of what is needed.
      ii) If giving opinion to co-worker at his or her request, gives opinions, reasons and recommendations orally.
      iii) Performer may decide to assist technologist and/or explain what is needed and why.
      iv) Performer may notify supervisor of consistently bad performance by a technologist.

List Elements Fully

   b. If the performer decides that there is a malfunction involving the output of the x-ray equipment, performer may request that the x-ray machine be examined or calibrated. Notifies supervisor.

   c. If the performer decides that the film processing equipment requires examination, decides to examine personally or notifies supervisor.

5. Performer records orders for any retakes and/or any suggestions for additional views on requisition sheet or as appropriate to institution.

   a. Performer specifies what is wrong or views missing, and/or what adjustments to make in technical settings, tube or patient positions and angulation, and any additional views recommended.
   b. Performer may give requisition sheet to supervisor, who gives it to technologist. May report equipment malfunction at this time.
   c. Reviews additional views and/or retakes when they are processed as described above.

6. When the performer decides that a radiographic study ordered for a given patient is complete, performer may decide to jacket radiographs, have this done, or places with requisition sheet as appropriate.

   May notify radiologic technologist or control desk that the patient's radiographic examination is completed.

   May make sure that patient is in the charge of someone who will properly discharge patient or accompany to next location.

TASK DESCRIPTION SHEET

Task Code No. 82

This is page 1 of 2 for this task.

1. **What is the output of this task? (Be sure this is broad enough to be repeatable.)**

Radiologic technologist or student shown and explained radiographic procedures involved in diagnostic radiography; person being trained evaluated for readiness to do activities under supervision; person observed and criticized; person evaluated for readiness to do tasks without direct supervision; person's work spot checked; questions answered; opinions on work given as requested; evaluation noted formally,informally,and/or reported.

2. **What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)**

Patients' x-ray requisition forms and records; materials and equipment needed for procedures in radiologic technology

3. **Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )**

4. **If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.**

Students in radiologic technology; radiologic technologists; any patients involved;supervisor(s)

5. **Name the task so that the answers to questions 1-4 are reflected. Underline essential words.**

Providing clinical training for radiologic technologists or students in radiographic technology by demonstrating procedures, explaining what is being done; answering questions; deciding when person being trained can perform tasks under direct supervision; observing and correcting; deciding when tasks can be done without direct supervision; spot checking and correcting; advising as requested or as deemed necessary; evaluating and recording or reporting.

List Elements Fully

Performer provides clinical training for students or subordinates in radiographic procedures and use of related equipment in diagnostic radiography as a result of:

a. Request or assignment to train new employee or student.
b. Performer's observation of employee's or student's work and decision that training is needed.
c. Request of employee or student who has questions about work.

1. Performer may be assigned individuals, may be requested, or may decide to provide training to individuals. Reviews related performance standards.

2. Performer provides demonstration, explanation, informal evaluation and supervision in technique, positioning, the procedures used for specific radiographic examinations, related patient care, sanitary procedures, film evaluation, radiation safety, fluoroscopic techniques, related equipment, film processing, handling of pediatric, sick, or disabled patients.

3. If performer is making a new presentation of any task, performer may select times, patients, and procedures to demonstrate; performer may train while carrying out own tasks:

OK-RP;RR;RR

6. **Check here if this is a master sheet..(X)**

This is new assignment to this number.

TASK DESCRIPTION SHEET (continued)

Task Code No. 82

This is page 2 of 2 for this task.

List Elements Fully

a. When performer has person being trained present during performer's own tasks, performer may explain purpose to patient and ask permission to have trainee present.

b. Performer explains to trainee what will be taught.

c. Performer may narrate the steps, may explain what is being done, or may explain the basis for decisions and actions.

d. Performer may decide to solicit questions to find out what the person being trained understands, may answer questions, or may elaborate on the explanation of what is being done, concentrating on the relevant skills and knowledges.

e. Performer decides when the person being trained has observed sufficiently and has a clear enough understanding of a procedure to carry it out under close, direct supervision and/or to assist.

4. Performer supervises and observes the person being trained while he or she carries out the activities assigned:

a. Performer asks the individual to do all or part of a procedure and remains at the side of the patient, or carries out own portion and watches the performance of the assigned activity.

b. While observing, performer decides whether the activity is being done properly, whether there is a specific problem, whether there is need to demonstrate the procedure again or explain, and does so.

c. Performer may comment on the performance, encourage or correct as deemed necessary, or do this later.

d. Performer may decide to intervene and take over the procedure, explaining what was done incorrectly at that point or later.

List Elements Fully

e. If decision is to demonstrate again, performer may redo and have the person being trained observe; may have the procedure repeated until it is done properly.

f. Performer decides which procedures or activities can be done by the individual without direct supervision. Informs proper supervisors, notes for own use, and/or tells this to the person being trained.

g. Performer explains own presence to any patient involved when the performer observes the person being trained.

5. Performer spot checks the person being trained while he or she carries out activities without direct supervision or responds to requests for guidance, assistance, or further instruction.

Performer proceeds as in steps 3 or 4 as appropriate, observing, noting areas needing improvement, determining the nature of any problem, assisting, giving opinions, answering questions, and providing further instruction on how to deal with unusual circumstances. Reinforces correct work. Suggests areas for improvement.

6. Performer informally notes the extent of learning or proficiency of the person being trained throughout the training:

a. May decide to discuss performance with individual at any time.

b. May keep formal records on what was taught or on progress.

c. May make personal notes for own use in later evaluation meetings or in discussion with supervisor of person being trained or person at student's school in charge of clinical training.

d. May decide to revise instruction or performance standards.

TASK DESCRIPTION SHEET

Task Code No. 353

This is page 1 of 1 for this task.

1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Issues for meeting reviewed and raised; participation in discussion on departmental matters; information passed to subordinates or co-workers.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pen; paper; personal notes; information to be presented; notice of meeting and agenda

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Staff of diagnostic x-ray department.

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Participating in meeting of diagnostic x-ray department technologists, by reviewing agenda and notes; raising issues; receiving information about and/or discussing departmental rules, functioning, new equipment, patient care, related problems or complaints.

List Elements Fully

The performer attends departmental meetings of technologists in diagnostic radiology department as a result of:

a. Request or notification.
b. Regular assignment.

1. During periods between meetings performer may mentally note problems or information which require attention, or may make notations about them. These include problems with regard to patient care or departmental functioning.

2. Before the meeting performer reviews any agenda distributed and own notes.

3. At the meeting, performer may receive information (verbal or written) and/or ask questions about or present problems in regard to:

    a. New departmental rules and regulations and announcements.
    b. The use of new equipment.
    c. Problems of patient care and related departmental functioning.
    d. Problems or complaints regarding departmental functioning or administration.

4. Performer listens, raises issues and/or participates in discussions raised by others. May take notes as desired.

5. Performer may receive suggestions for own work and discuss.

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

TASK DESCRIPTION SHEET

Task Code No. 355

This is page 1 of 11 for this task.

1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured,positioned,measured;technical factors selected and set;film identified;technique for multiple views and/or magnification set up;exposures made;arrangement made to have radiographs processed and evaluated;procedures repeated for full set of views;pt. returned;examination recorded;radiographs placed for use.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,bracelet;technical history;pen;x-ray machine control panel(s); posted technique chart;standard views,tube-rating, dosage,conversion charts;x-ray table and tube,collimator,extension cones;cassettes or non-screen film holders;vertical film stand;leaded rubber shielding; lead or aluminum markers;leaded garments;immobilization devices;stool;calipers;tape;scissors;stretcher or wheelchair;marking pen

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(x) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-pediatric patient to be radiographed; radiologic technologist; radiologist; nurse

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Taking plain film radiographs of fingers, hand(s) or wrist(s) of non-infant patient by reviewing request;reporting observed contraindications;reassuring pt.;measuring part;setting up for multiple views and/or magnification technique as appropriate;selecting and setting technical factors;identifying film;positioning pt. and equipment;providing shielding;collimating;making exposures;having radiographs processed and reviewed;repeating for full set of views or as ordered;having pt. returned and placing radiographs for filing as appropriate;recording examination.

List Elements Fully

Performer receives or obtains the x-ray requisition form, patient's identification card, and any appropriate medical-technical history for a non-infant patient scheduled for radiography of the finger(s), hand(s) or wrist(s):

a. After checking assignment on schedule sheet.
b. From co-worker.
c. After having arranged requisitions in order of priority.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations,and to check the completeness of the information provided.

   a. Performer checks the examination called for, including the part(s) of the body involved, the number and type of projections (whether standard or spedial views, technique), whether there is request for magnification; notices whether right and/or left hand is involved, specific finger(s), wrist, whole hand, etc. Checks the name of the referring physician.
   b. Performer notices whether suspected fracture is involved and suspected location, whether foreign body in hand is to be found,and location of entry site; notes whether study is an

OK-RP;RR;RR

6. Check here if this is a master sheet..(v)

TASK DESCRIPTION SHEET (continued)

Task Code No. 355

This is page 2 of 11 for this task.

List Elements Fully

emergency, whether patient is in-patient or out-patient.

c. Performer reads patient's name, identification number, sex, age, weight. Notices whether patient's examination involves a cast on the part to be radiographed; reads any notation on the nature of any known pathology which would affect technique (such as bone infection), and the purpose of the study.

d. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, catheters or similar devices in place, whether patient will be accompanied by nurse or other staff person. Notes shielding needed.

e. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved. Goes to examination room or control room for machine involved.

f. If magnification has been requested, performer checks that the machine to be used has a fractional focal spot of appropriate size for direct magnification technique (i.e. 0.3 mm or smaller).

g. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete. Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

h. Depending on institutional procedures performer may review patient's radiation exposure history, prior record of techniques used,and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether number of radiographic exposures ordered or done in past should be brought to radiologist's attention.

List Elements Fully

i. Depending on institutional procedures performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period,or notes any other indication that there is no danger of exposure of a known or possible fetus.

j. If patient's record indicates orders for sedation or any other prior medication performer may check timing to be sure a proper elapse of time has occurred for medication to take effect. May arrange to delay examination if appropriate.

k. If referring physician has requested that film already on file be sent with current radiographs and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer notifies supervisor, radiologist or other designated staff person depending on institutional procedures. Explains the problem if appropriate and proceeds after obtaining appropriate information, signature or orders.

3. When performer is clear about what will be involved in examination, he or she prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Performer reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).

TASK DESCRIPTION SHEET (continued)

Task Code No. 355

This is page 3 of 11 for this task.

List Elements Fully

List Elements Fully

b. Performer washes hands as appropriate; depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.

c. Performer makes sure that x-ray equipment is ready for use. Goes to controls for x-ray generator and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for machine to "warm up." If appropriate, performer may set radiography mode selector and manual collimator control setting.

d. Performer checks that appropriate immobilization devices such as sandbags, sponges and balsa blocks are present.

e. Checks that there is leaded rubber shielding available in room to be used to mask film, protect the patient and/or to place beneath the film holder, as appropriate.

f. Performer prepares for identification of the films using equipment provided by institution:
   - i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
   - ii) Performer may prepare for use of flashcard by checking that there is a lead piece on film holder surface; may write or type out information on card if not received with requisition.
   - iii) Checks identification against requisition sheet.
   - iv) Performer makes sure that right (R) and left (L) markers are available for use.

4. If magnification has been requested, performer prepares the equipment for the tube-over-table method of magnification:

a. Performer determines the degree of magnification requested on the requisition sheet; if the request is expressed as an area magnification, performer determines the linear magnification by taking the square root. (Linear magnification squared equals area magnification.)

b. Performer calculates the required distances from target (focal spot) to object (patient) (TOD), and from object to film (OFD), as well as the distance from target to film (TFD) (the sum of TOD and OFD):
   - i) If the distance from the table top to a film holder placed on the floor or a stool (OFD) will be a relatively inflexible distance, performer measures this distance or reads indicator scale. (If stool is to be used, may note the table height involved.) Performer may adjust table height to provide for a round number for the OFD.
   - ii) If the distance from the focal spot to the table top (TOD) will be the relatively inflexible distance, performer determines what this is by measuring or reading appropriate indicator scale on tube housing. Performer may adjust tube height to provide a round number for the TOD.
   - iii) Depending on whether the OFD or the TOD is fixed, performer calculates the required complementary distance by referring to a magnification chart for the degree of linear magnification required, or uses the formula: degree of linear magnification equals TFD divided by TOD. For a two-times linear magnification performer simply sets the TOD equal to the OFD.

TASK DESCRIPTION SHEET (continued)

Task Code No. 355

This is page 4 of 11 for this task.

List Elements Fully

iv) Performer adjusts and locks the table height and/or the tube height to the calculated OFD and TOD.

c. Performer aligns the object-film and target-object distances:

i) Performer moves the x-ray tube housing until it is centered over the table top in the approximate area where the patient's area of interest (finger, hand or wrist) will be positioned, such as at head of table.

ii) Performer swings the table out of the way so that there is no obstruction between the tube and the floor. (Does not change height.) If appropriate, places the stool on the floor under the tube. May place lead shielding on floor or on stool. May place film holder on floor or stool.

iii) Performer selects the size film holder designated for the degree of magnification and the selected part to be studied.

iv) Performer sets the collimator (on manual control) so that the aperture directly corresponds to the area of interest (field size) for the TOD involved.

v) Performer activates the light in the collimator and adjusts the tube so that the light beam cast outlines the film holder. Uses the cross-hairs projected by the beam to center the tube to an area on the floor or stool.

vi) Performer locks the tube into position so that there is a 90° angle of the beam with the floor or stool. Fixes and retains collimator setting.

vii) Performer marks the outline of the collimated light area or film holder on the floor or stool or on the lead shielding using tape or other removable marker. If not already done, checks by placing film holder in marked area. May mark center of area as shown by cross-hairs.

List Elements Fully

viii) Performer swings table back into place. Activates light beam in collimator and marks the table top where the center cross-hairs and field of interest are projected (to be used to center the part to be radiographed). Uses tape or other radiolucent removable marker.

ix) Performer may recheck TOD and OFD to be sure that they correspond to the calculated distances.

d. For magnification technique using a vertical film holder, performer may wait until patient has been brought into examination room. Adjusts upright holder to appropriate height; adjusts x-ray tube to right angle projection of beam to film holder; centers to the film; measures and adjusts TOD to patient's position and marks patient's position; measures and adjusts OFD from patient's position as marked.

e. If the sum of the new TOD and OFD (TFD) is now different from the TFD used for non-magnification technique, performer may consult technique chart to note the factor to use for a compensatory change in mAs. May record for later use in setting exposure factors.

f. Performer may also note the change in kVp and mAs necessary to compensate for any change in collimation from non-magnification technique. Consults appropriate charts for conversion factors. May record.

5. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

TASK DESCRIPTION SHEET (continued)

Task Code No. 355

This is page 5 of 11 for this task.

List Elements Fully

List Elements Fully

a. Depending on institutional arrangements performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

b. Performer greets patient and any accompanying staff person; introduces self. Checks patient's identity against requisition sheet. With inpatient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

c. Performer has patient sit comfortably on a stool placed next to the x-ray table. If patient is in wheelchair, moves patient in chair into position next to table. If patient is on wheeled stretcher, places stretcher into position so that patient's hand can be easily placed on x-ray table while patient lies on stretcher.

d. Performer explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

e. Performer answers patient's nonmedical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains when asked medical questions that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

f. If patient has an IV drip in place performer checks that needle has not become dislodged and that the fluid is dripping at an even rate. If there are any problems, performer clamps tube and notifies an appropriate staff person at once.

g. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs appropriate physician and proceeds only with approval.

6. Performer questions patient and/or RN or MD present on what movement is possible in the affected extremity and on the opposite side; may question patient about any injury or pain to determine what mobility is possible and what positions are available for use.

a. If movement is limited or fracture is suspected, performer considers alternative x-ray tube and patient positions to use to accomplish the equivalent radiography with a minimum of movement by the patient. May decide to use upright film holders in appropriate positions to accomplish this.

b. Performer reviews the standard number and types of projections for the examination. Performer may consider a change from routine examination to better accomplish the purpose of the examination such as a change, addition, or deletion of a projection or a change in technical factors. Depending on institutional arrangements performer may obtain permission from appropriate radiologist or decides personally to alter the standard procedure.

7. Performer prepares for the examination:

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a. Performer selects speed, type of film for nonscreen film holder or cassette as determined by institutional practice; selects film and holder sizes based on the size of the part, the number of exposures planned for each film, and the needs of magnification technique.

b. Performer makes sure that an adequate supply of the appropriate loaded film holders is available in the examination room. If not, arranges to obtain or decides to obtain personally.

c. If not already done, has patient remove all jewelry; may arrange to have patient's belongings checked or decides to do personally. If patient is suffering from a fracture, performer has staff member in attendance remove the necessary clothing from the area. Does not remove or adjust splint personally.

d. If patient has a dressing covering a wound, performer may have it inspected and changed if appropriate; may have wet dressing reinforced or decides to do personally.

e. Performer provides everyone who will remain in room during exposure with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure. If a staff member will be asked to assist in positioning or if patient will be asked to use hand not being studied to assist in positioning, performer provides leaded gloves for shielding.

f. Performer obtains the appropriate size loaded film holder or cassette for the first projection.

g. If several views will be taken on one film, performer mentally decides how these will be positioned so that the film need not be turned for viewing each image. Performer uses leaded rubber sheets and masks the film holder completely except for the area to be exposed. Treats the area to be exposed from this point as though it were the actual film size.

h. Performer attaches identification information to the film holder or table top:
   i) Places right or left marker on film holder or table-top as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.
   ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of film holder.
   iii) If patient's identification information is to be entered by use of flasher, sets flashcard aside for later use with space created by piece of leaded rubber on appropriate edge of holder.
   iv) Performer may place patient's card into card tray for equipment using automatic film marking device.

i. Performer places the film holder on the table top in a position that can be comfortably reached by the patient in final positioning. May place leaded rubber sheet under film holder.
   i) If magnification technique is to be used, performer places film holder in marked position on floor or stool.
   ii) If appropriate to make possible minimal movement of patient, performer may place upright holder at right angles to table top or in other position to hold film.

j. Performer sets the focal-film distance if not already done (as with magnification technique):

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i) Operates controls or manually moves the x-ray tube into place over the film holder (or at right angles to upright holder).

ii) Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD is obtained.

8. Performer has patient place hand in relaxed position on x-ray table or in any non-painful position so that the part(s) to be radiographed can be measured in position.

   Depending on the positions to be radiographed,performer uses calipers to measure the thickness of the part(s) in the directions in which the center of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors.

9. Performer selects the exposure factors for the first projection by consulting the technique chart(s) posted for the machine:

   a. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure technique relates to the combination of film type and speed and the use or nonuse of other relevant accessories.
   b. Makes note of the kVp, mA, T(seconds of exposure time),focal spot size, and the focal-film distance (TFD or FFD) called for.
   c. Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for a pathological condition, a dry or wet cast on the part, the preference of the radiologist involved, and any other conversion needed such as with use of magnification technique. Performer looks up numerical factor(s) and calculates or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA or time). Multiplies, divides, adds, or subtracts as appropriate.
   d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

10. Performer sets exposure factors as selected:

    a. Enters control room. Makes sure that indicator light shows that x-ray generator is ready for use. Makes sure that machine is warmed up and that all circuits have been stabilized.
    b. If appropriate, checks line voltage meter and, if required,turns compensator dial until needle is aligned properly on line meter.
    c. Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.
    d. Performer selects and sets the exposure time that will produce the mAs desired.
    e. Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

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f. If appropriate for equipment, sets controls to provide for manual control at table-side of x-ray tube and table height,position, and for collimation (unless these have already been set such as with magnification technique).

11. Performer places the part to be radiographed in final position for the first exposure. Makes sure that correct hand and part are being positioned. Performer centers part. Keeps long axis of part parallel to the film. Performer may demonstrate the positions desired. For young patients performer may plan to make exposure of unaffected side for comparison purposes depending on institutional practices.

Performer may position as follows (unless nonconventional positioning is being used to avoid having patient move):

a. For the thumb, performer centers with reference to the distal end of the proximal segment.
   i) For AP projection (to obtain posterior view) performer has patient place hand on film. Has patient rotate hand internally so that beam will enter mid-posterior surface of the thumb. Immobilizes and supports with sandbag or sponges. Instructs patient to hold back and support other fingers with other hand, and keep fingers out of central ray; provides lead shielding.
   ii) For oblique view has patient place palm flat on holder, properly centered at the mid-portion of the thumb. Uses sandbags to support and immobilize.
   iii) For lateral view has patient place palm flat and flex fingers to rotate thumb so that true lateral position is obtained. Uses sandbags to support and immobilize.

b. For individual fingers, performer centers with reference to the metacarpophalangeal joint of the finger. When finger to be studied is extended has patient close the other fingers into a fist.
   i) For PA projection (to obtain anterior view) performer places the finger flat on the holder with hand pronated.
   ii) For oblique view rotates hand externally or internally depending on the finger involved.
   iii) For lateral view performer has patient extend the finger with hand at right angles to table top. Uses sponge or wood block to steady and support finger.

c. For the hand, performer centers with reference to the distal ends and shafts of the metacarpal bones. If there is a suspected foreign body in the hand, performer determines the point of entry and tapes a small lead marker over the point. Usually takes only anterior and lateral views.

Makes sure that patient is able to rest both hand and forearm comfortably on table top. Places hand on film holder and has patient relax and separate fingers.
   i) For anterior view (PA projection) has hand placed in prone position.
   ii) For oblique view has patient rotate hand externally to about 40°, then flex and separate fingers and extend thumb. Uses sandbag, block or sponge to provide stability.
   iii) If lateral view is required has hand rotated from oblique position to true lateral position so

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that metacarpals and phalanges are superimposed. Uses sponge or wood block to support thumb.

d. For the wrist, performer centers with reference to the radial and ulnar styloid processes. If the wrist is in a cast or splint performer centers by comparing with opposite wrist in identical position.

Has patient rest hand and forearm on table top with wrist centered on the film holder (or unmasked portion of holder).

   i) For anterior view (PA projection) has patient place hand in prone position.
   ii) For oblique view has patient rotate wrist externally 40° from prone position. Uses sponge or block for support and sandbag to immobilize.
   iii) For semi-supinated view, has patient rotate wrist from AP position as appropriate.
   iv) For lateral view has patient rotate wrist externally 90° from prone position, fingers extended, and thumbs extended adjacent to hand so that ulnar side of wrist is facing film holder.
   v) For projection of ulnar flexion places wrist in PA position and then has patient turn hand inward toward the radius as much as possible.

e. If patient shows signs of pain during positioning, performer may decide on alternative position to avoid movement of affected part or reports to physician or RN.

12. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Uses cross-hair shadows as reference for center of field. Checks that primary beam will enter the center of the area of interest at right angles to the film and so as to project the view desired. For the first view of a series may mark a point on the part that is even with the center of the film holder so that later views may be easily lined up. May readjust tube position lengthwise or crosswise to provide better centering.

13. Performer adjusts collimation. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest and thus provide maximum protection and detail. If appropriate, performer may attach auxiliary extension cone to collimator to further reduce the primary beam.

14. Performer may add lead shielding to areas that will be in the primary path of the beam but are not included in areas of interest. Makes sure that proper protective shielding has been provided to everyone who will remain in room.

15. Throughout procedure performer observes patient for any signs of emergency or accidental harm. If patient shows signs of distress or faints, loses consciousness, or has an accident, performer calls appropriate physician at once. May decide to provide emergency first aid as well.

16. When everything is ready for the exposure, performer explains to patient the need to keep perfectly still when indicated by performer and until told to relax. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

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17. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to hold still by calling or using intercom. Performer initiates exposure by pressing hand trigger or exposure control button.

    a. While exposure is underway performer checks that mA meter records appropriate current as set, and that kVp meter dips slightly.
    b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.
    c. After exposure is completed tells patient that he or she can relax.
    d. If exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on the circuit. Anticipates need to repeat exposure.

18. Performer returns to patient. Removes film holder from its location. Removes any markers.

    a. If multiple views are to be taken on the film, removes lead masking and remasks all but the next area to be exposed.
    b. If the patient is being examined for possible fracture or if so requested, performer arranges to have the first exposure processed at once and brought to the appropriate radiologist.
    c. Depending on whether radiologist will evaluate radiographs before completion of all possible exposures for the series, performer arranges to process film(s) and evaluate for quality control personally, have this done, or bring to dark room for processing and later evaluation, based on time available, institutional arrangements or specific instructions. Attaches ID card for use with flasher if appropriate. May sign requisition.
    d. While films are being processed and/or evaluated performer has patient relax in examination room or holding area. If appropriate makes sure that patient is attended.
    e. When (or if) performer learns from the radiologist the extent of the injury and/or whether further conventional views and/or positions can be undertaken, eliminated, or altered, performer proceeds as appropriate according to instructions.
    f. For further exposures performer repeats appropriate steps for next view(s) including identification of film holder and use of R-L marker, selection and setting of technique for next view (if different), positioning patient and equipment for focus-object-film alignment, proper collimation, shielding, and making exposure, as described above. For multiple views on one film keeps R-L reference point constant; centers using the point marked earlier on the part to line up with center of film.
    g. Performer refrains from commenting on the films or providing any interpretation.

19. If performer is asked to repeat any exposures, makes sure that the additional exposures are warranted medically, since additional radiation will be incurred.

    a. Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."

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b. If request for retakes reflects malfunctioning equipment performer reports malfunction to appropriate staff member.

c. If request for retakes reflects the preference for density or contrast of a radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.

20. When performer is sure that the examination has been completed, performer may have patient transported back to holding area or next location, or decides to do personally as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool.

21. Performer carries out termination steps for the examination:

    a. Has equipment and examination table cleaned after use or decides to do personally, depending on institutional arrangements.

    b. Performer records the examination according to institutional procedures. May include date, room, examination type, the views taken, the technical factors used, and the film size; may record the number of exposures for each view, including retakes; may enter the estimated radiation dose to which patient was exposed (based on posted information), any comments on equipment failure, or special care provided for patient. If any views called for could not be obtained records reason. Signs requisition.

    c. Performer may decide to jacket films, requisition sheets, and related materials and/or have information recorded in log book or has this done, depending on institutional procedures.

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d. If appropriate, indicates to staff member when ready to do next examination.

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1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured,positioned;part measured;films identified;technical factors selected and set;technique for magnification set up;exposures made;radiographs sent for processing and evaluation; procedures repeated as appropriate for full set of views;patient returned;examination recorded;radiographs placed for use.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,bracelet,technical history;pen;x-ray machine control panel(s), tube,table,collimator,extension cones;technique chart;charts for conversion of technique,standard examination views,dosage,tube capacity;cassette or non-screen film holders;vertical film stand;leaded rubber shielding;R and L and ID markers;immobilization devices;stools;calipers;tape;scissors;stretcher or wheelchair

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(x) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-pediatric patient to be radiographed; radiologic technologist; radiologist; nurse

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Taking plain film radiographs of forearm and/or elbow joint of non-infant patient by reviewing request,reporting observed contraindications;reassuring pt.;measuring pt.'s part(s);selecting and setting technical factors;identifying film;positioning pt. and equipment for conventional or magnification technique;providing shielding;collimating;making exposures;after processing and review repeating for appropriate views until full set of radiographs are completed as ordered;having pt. returned;placing films for use;recording examination.

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Performer receives or obtains the x-ray requisition form, patient's identification card, and any appropriate medical-technical history for a non-infant patient scheduled for radiography of the forearm and/or elbow joint:

a. After checking assignment on schedule sheet.
b. From co-worker.
c. After having arranged requisitions in order of priority.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided.
   a. Performer checks the examination called for, including the part(s) of the body involved and extent of the area of interest, the number and type of projections (whether standard or special views, technique), whether there is request for magnification; notices whether right and/or left arm is involved and,with forearm,whether distal and/or proximal joint is to be included, or,with elbow,whether lower humerus or upper forearm is to be included. Checks name of referring physician.
   b. Performer checks whether there is a suspected fracture, whether a known frac-

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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ture exists, whether any splint is to be left in place or removed by a physician. Notes whether study is an emergency, whether patient is in-patient or out-patient.

- c. Performer reads patient's name, identification number, sex, age, weight. Reads any notation on the nature of any known pathology which would affect technique (such as bone infection), and the purpose of the study.
- d. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, catheters or similar devices in place, whether patient will be accompanied by nurse or other staff person. Notes shielding needed.
- e. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved. Goes to examination room or control room for machine involved.
- f. If magnification has been requested, performer checks that the machine to be used has a fractional focal spot of appropriate size for direct magnification technique (i.e. 0.3 mm or smaller).
- g. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete. Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.
- h. Depending on institutional procedures performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past.

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- i. Depending on institutional procedures,performer notes whether female patient is pregnant, date of female patient's last menstrual period,or notes any other indication that there is no danger of exposure of a known or possible fetus.
- j. If patient's record indicates orders for sedation or any other prior medication performer may check timing to be sure a proper elapse of time has occurred for medication to take effect. May arrange to delay examination if appropriate.
- k. If referring physician has requested that film already on file be sent with current radiographs,and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer notifies supervisor, radiologist,or other designated staff person, depending on institutional procedures. Explains the problem if appropriate and proceeds after obtaining needed information, signature or orders.

3. When performer is clear about what will be involved in examination he or she prepares ahead so as not to keep patient in examination room longer than necessary:

   - a. Performer reviews the technique chart for the machine to be used

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and takes note of newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).

b. Performer washes hands as appropriate; depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.

c, Performer makes sure that x-ray equipment is ready for use. Goes to control panel for x-ray generator and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment, and allows time for machine to "warm up." If appropriate, performer may set radiography mode selector and manual collimator control setting.

d. Performer checks that appropriate immobilization devices such as sandbags or sponges are present.

e. Checks that there is leaded rubber shielding available in room to be used to mask film, protect the patient and/or place beneath the film holder, as appropriate.

f. Performer prepares for identification of the films using equipment provided by institution:

  i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.

  ii) Performer may prepare for use of flashcard by checking that there is a piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.

  iii) Checks identification against requisition sheet.

  iv) Performer makes sure that right (R) and left (L) markers are available for use.

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4. If magnification has been requested, performer prepares the equipment for the tube-over-table method of magnification:

a. Performer determines the degree of magnification requested on the requisition sheet; if the request is expressed as an area magnification, performer determines the linear magnification by taking the square root. (Linear magnification squared equals area magnification.)

b. Performer calculates the required distances from target (focal spot) to object (patient) (TOD), and from object to film (OFD), as well as the distance from target to film (TFD) (the sum of TOD and OFD).

  i) If the distance from the table top to a film holder placed on the floor or a stool (OFD) will be a relatively inflexible distance, performer measures this distance or reads indicator scale. (If stool is to be used, may note the table height involved.) Performer may adjust table height to provide for a round number for the OFD.

  ii) If the distance from the focal spot to the table top (TOD) will be the relatively inflexible distance, performer determines what this is by measuring or reading appropriate indicator scale on tube housing. Performer may adjust tube height to provide a round number for the TOD.

  iii) Depending on whether the OFD or the TOD is fixed, performer calculates the required complementary distance by referring to a magnification chart for the degree of linear magnification required, or uses the formula: degree of linear magnification equals TFD divided by TOD. For a two-times linear magnifica-

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tion performer simply sets the TOD equal to the OFD.

- iv) Performer adjusts and locks the table height and/or the tube height to the calculated OFD and TOD.

c. Performer aligns the object-film and target-object distances:

- i) Performer moves the x-ray tube housing until it is centered over the table top in the approximate area where the patient's area of interest (forearm or elbow joint) will be positioned, such as at head of table.
- ii) Performer swings the table out of the way so that there is no obstruction between the tube and the floor. (Does not change height.) If appropriate, places the stool on the floor under the tube. May place lead shielding on floor or on stool. May place film holder on floor or stool.
- iii) Performer selects the size film holder designated for the degree of magnification and the selected part to be studied.
- iv) Performer sets the collimator (on manual control) so that the aperture directly corresponds to the field size (area of interest) for the TOD involved.
- v) Performer activates the light in the collimator and adjusts the tube so that the light beam cast outlines the film holder. Uses the cross-hairs projected by the beam to center the tube to the area on the floor or stool.
- vi) Performer locks the tube into position so that there is a 90° angle of the beam with the floor or stool. Fixes and retains collimator setting.
- vii) Performer marks the outline of the collimated light area or film holder on the floor or stool or on the lead shielding using tape or other removable marker. If not already done, checks by placing film holder in marked area. May mark center of area as shown by cross-hairs.
- viii) Performer swings table back into place. Activates light beam in collimator and marks the table top where the center cross-hairs and field of interest are projected (to be used to center the part to be radiographed). Uses tape or other radiolucent removable marker.
- ix) Performer may recheck TOD and OFD to be sure that they correspond to the calculated distances.

d. For magnification technique using a vertical film holder, performer may wait until patient has been brought into examination room. Adjusts upright holder to appropriate height; adjusts x-ray tube to right angle projection of beam to film holder; centers to the film; measures and adjusts TOD to patient's position and marks patient's position; measures and adjusts OFD from patient's position as marked.

e. If the sum of the new TOD and OFD (TFD) is now different from the TFD used for non-magnification technique, performer may consult technique chart to note the factor to use for a compensatory change in mAs. May record for later use in setting exposure factors.

f. Performer may also note the change in kVp and mAs necessary to compensate for any change in collimation from non-magnification technique. Consults appropriate charts for conversion factors. May record.

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5. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

   a. Depending on institutional arrangements performer may decide to escort out-patient to or from dressing rooms. May decide to assist in transporting patient from holding area or have this done.
   b. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.
   c. Performer has patient sit comfortably on a stool placed next to the x-ray table and low enough to place the entire arm on the same plane. If patient is in wheelchair, moves patient in chair into position next to table. If patient is on wheeled stretcher, places stretcher into position so that patient's hand and arm can be easily placed on x-ray table while patient lies on stretcher.
   d. Performer explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.
   e. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains when asked medical questions that it is not appropriate for technologist to answer these; encourages patient to speak to physician.
   f. If patient has an IV drip in place, performer checks that needle has not become dislodged and that the fluid is dripping at an even rate. If there are any problems, performer clamps tube and notifies an appropriate staff member at once.
   g. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs appropriate physician and proceeds only with approval.

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6. Performer questions patient and/or RN or MD present on what movement is possible in the affected extremity and on the opposite side; may question patient about any injury or pain to determine what mobility is possible and what positions are available for use.

   a. If movement is limited or fracture is suspected, performer decides on alternative x-ray tube and patient positions to use to accomplish the equivalent radiography with a minimum of movement by the patient. May decide to use upright film stand in appropriate positions to accomplish this.
   b. Performer reviews the standard number and types of projections for the examination. Performer may consider a change from routine examination to better accomplish the purpose of the examination such as a change, addition, or deletion of a position, or a change in technical factors. Depending on institu-

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tional arrangements, performer may obtain permission from appropriate radiologist or decides personally to alter the standard procedure.

7. Performer prepares for the examination:

   a. Performer selects speed, type of film, nonscreen film holder or cassette as determined by institutional practice; selects film and holder sizes based on the part to be studied (to include both ends of the ulna and radius for forearm study, and to include the designated area of humerus and/or forearm in elbow study), and the number of exposures planned for each film. Considers needs of magnification technique.
   b. Performer makes sure that an adequate supply of loaded film holders of the sizes selected is available in the examination room. If not, arranges to obtain or decides to obtain personally.
   c. If not already done, has patient remove all jewelry; may arrange to have patient's belongings checked or decides to do personally.
   d. If there is an injured arm to be radiographed performer has patient remove sleeve from unaffected side before slipping sleeve off affected side. If there is a splint on injured area performer has this removed by appropriate staff member or left in place, depending on orders, but does not remove personally.
   e. If a wet dressing is involved performer has it reinforced or decides to do personally.
   f. Performer provides everyone who will remain in room during exposure with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

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   g. Performer obtains the appropriate size loaded cassette or film holder for the first projection.
   h. If several views will be taken on one film, performer mentally decides how these will be positioned so that the film need not be turned for viewing each image. Performer uses leaded rubber shielding and masks the film holder appropriately except for the area to be exposed. Treats the area to be exposed from this point as though it were the actual film size.
   i. Performer attaches identification information to the film holder or table top:
      i) Places right or left markers on film holder or table top as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.
      ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of film holder.
      iii) If patient's identification information is to be entered by use of flasher, sets flashcard aside for later use with space created by piece of leaded rubber on appropriate edge of holder.
   j. Performer places the film holder on the table top in a position that can be comfortably reached by the patient for final positioning. May place leaded rubber sheet under film holder.
      i) If magnification technique is to be used performer places film holder in marked position on floor or stool.
      ii) If appropriate to make possible minimal movement of patient, performer may place upright holder at right angles to the

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table top or in other position to hold film.

k. Performer sets the focal-film distance (if not already done, as with magnification technique):
   i) Operates controls or manually moves the x-ray tube into place over the film holder (or at right angles to upright holder).
   ii) Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD is obtained.

8. Performer has patient place hand and elbow on the table top in relaxed supine and/or flexed position or in any non-painful position so that the part(s) to be radiographed can be measured. Depending on the positions to be radiographed, performer uses centimeter calipers to measure the thickness of the part(s) in the directions in which the center of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors.

9. Performer selects the exposure factors for the first projection by consulting the technique chart(s) posted for the machine:

   a. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other relevant accessories.
   b. Makes note of the kVp, mA, T(seconds of exposure time), focal spot size, and the focal-film distance (TFD or FFD) called for.

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   c. Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for a pathological condition, the preference of the radiologist involved, and any other conversion needed such as with magnification technique. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA or time). Multiplies, divides, adds, or subtracts as appropriate.
   d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

10. Performer sets exposure factors as selected:

   a. Enters control room. Makes sure that indicator light shows that x-ray generator is ready for use. Makes sure that machine is warmed up and that all circuits have been stabilized.
   b. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.
   c. Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.
   d. Performer selects and sets the exposure time that will produce the mAs desired.

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e. Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

f. Depending on the equipment, may set controls to provide for manual control of table and tube height, position, and collimation at tableside (unless these have already been set, as with magnification technique).

11. Performer places the part to be radiographed in final position for the first exposure. Makes sure that correct arm is being positioned. For young patients performer may plan to radiograph the unaffected side for comparison purposes. For nonconventional positioning performer centers the tube so that the primary ray will pass through the part at right angles to the film in the projection desired (or at appropriate angle).

Performer may position as follows (unless nonconventional positioning is being used to avoid having patient move):

a. For the forearm, performer centers with reference to the radial and ulnar styloid processes and the lateral and medial epicondyles of the humerus with the central ray at right angles to the center of the part and the film. Makes sure that the long axis of the forearm is parallel with the film. May help patient to lean laterally to achieve desired positions.

  i) For the posterior view (AP projection) performer has the patient rest the hand and elbow on the film holder in an extended supine (palm up) position. Includes the joint nearer the injured site on the holder. Uses sponge or sandbags to immobilize.

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  ii) For the lateral view has patient rotate forearm internally from the AP position to 90°, and flex the elbow 90° with the upper arm resting comfortably on the table and the thumb of the hand up. Makes sure that the long axis of the forearm is parallel to film. Includes the distal or proximal joint in the same plane, as in the posterior view. Makes sure that the radius, ulna and carpal bones are in lateral superimposition. Uses sandbags to support hand.

b. For the elbow joint, performer centers to the joint. Directs central ray at right angles to film holder (except for view of proximal forearm in flexated frontal projection and for axial projection). May help patient to lean laterally to achieve desired positions.

  i) For the posterior view (AP projection) performer positions patient on low stool with hand in supine position, shoulder in same horizontal plane as elbow, and anterior surface of elbow parallel to plane of film. Makes sure that the medial and lateral epicondyles of the humerus are parallel to the film holder. (If a full elbow extension is not possible, performer may provide a posterior view of the proximal forearm and one of the distal humerus.)

  ii) For the lateral projection has patient rotate elbow internally 90° and flex elbow 90° with upper arm resting on table and humerus projecting off the medial aspect of the film holder, with arm and forearm in same plane and parallel to table top. Makes sure wrist is in lateral, thumb up position.

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iii) For the AP internal oblique projection (posterior oblique view), performer has patient rotate forearm, elbow, and arm internally 45° from the extended position.

iv) For the frontal projection of acute flexion, performer uses stool low enough for patient to rest dorsal surface of upper arm on film holder. Has patient flex forearm as far as possible over the humerus. For view of distal humerus performer directs the central ray at right angles to the flexed forearm.

v) For axial projection of distal humerus and olecranon process, performer seats patient so that the dorsal surface of the flexed elbow and the forearm are resting on the table top, with the forearm at right angles to the medial plane of the body and the palm of hand turned up. Assists patient into position so that the process is not rotated. Performer directs the central ray anteriorly to the most prominant part of the olecranon process at an angle of about 25°.

c. If, during positioning, patient shows signs of severe pain, performer may notify appropriate physician at once and await orders, or may decide on alternative positioning to avoid movement of the affected part.

12. Performer checks final positioning. Activates the light in collimator. Uses cross-hair shadows as reference for center of field. Checks that primary beam will enter the center of the area of interest at right angles to the film (or selected angle) so as to project the view desired. For the first view of a series may mark a point on the part that is even with the center of the film holder for use in lining up subsequent views. May readjust tube position lengthwise or crosswise to provide better centering.

13. Once the patient has been positioned and immobilized performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film, or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). If appropriate, performer may attach auxiliary extension cone to collimator to further reduce the primary beam.

14. Performer may add lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that proper protective shielding has been provided to everyone who will remain in room.

15. Throughout procedure performer observes patient for any signs of emergency or any accidental harm. If patient shows any signs of distress or faints, loses consciousness, or has an accident, performer calls appropriate physician or nurse at once. May decide to provide emergency first aid as well.

16. When everything is ready for the exposure, performer explains to patient the need to keep perfectly still when indicated by performer and until told to relax. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

17. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to hold still by calling or using intercom. Performer initiates

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exposure by pressing hand trigger or exposure control button.

a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.
c. After exposure is completed tells patient that he or she can relax.
d. If exposure is terminated by circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

18. Performer returns to patient. Removes film holder from its location.

a. Removes any markers. If multiple views are to be taken on the film, removes leaded rubber mask and remasks all but next area to be exposed.
b. If the patient is being examined for possible fracture or if so requested, performer arranges to have the first exposure processed at once and brought to the appropriate radiologist.
c. Depending on whether radiologist will evaluate radiographs before completion of all possible exposures for the series, performer arranges to process film(s) and evaluate for quality control personally, have this done, or bring to dark room for processing and later evaluation, based on time available able, institutional arrangements, or specific instructions. Attaches ID card for use with flasher if appropriate. May sign requisition.

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d. While films are being processed and/or evaluated performer has patient relax in examination room or holding area. If appropriate makes sure that patient is attended.
e. When (or if) performer learns from the radiologist the extent of the injury and/or whether further conventional views and/or positions can be undertaken, eliminated, or altered, performer proceeds as appropriate according to instructions.
f. For further exposures performer repeats appropriate steps for next view(s) including identification of film holder and use of R-L marker, selection and setting of technique for next view (if different), positioning patient and equipment for focus-object-film alignment, proper collimation and shielding, and making exposure as described above. For multiple exposures on one film, keeps R-L reference point constant; centers using the point marked earlier on the part to line up with center of film.
g. Performer refrains from commenting on the films or providing any interpretation.

19. If performer is asked to repeat any exposures, makes sure that the additional exposures are warranted medically, since additional radiation will be incurred.

a. Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."
b. If request for retakes reflects malfunctioning equipment performer reports malfunction to appropriate staff member.
c. If request for retakes reflects the preference for density or contrast of a radiologist, performer

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notes for future work done for the given radiologist so that retakes can be avoided. 20. When performer is sure that the examination has been completed, performer may have patient transported back to holding area or next location,or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool. 21. Performer carries out termination steps for the examination: a. Performer has equipment and examination table cleaned after use or decides to do personally, depending on institutional arrangements. b. Performer records the examination according to institutional procedures. May include date, room, examination type, the views taken, the technical factors used,and film size; may record the number of exposures made of each view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. If any views called for in the initial request could not be obtained performer may record reasons. Signs requisition sheet. c. Performer may decide to jacket films, requisition sheets, and related materials and/or have information recorded in log book, or has this done, depending on institutional procedures. d. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

TASK DESCRIPTION SHEET

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1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Requisition reviewed; pt. reassured, positioned, parts measured; films identified; technical factors selected and set; technique for magnification set up; exposures made; radiographs sent for processing and evaluation; procedures repeated as appropriate for full set of views; patient returned; examination recorded; radiographs placed for use.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet, ID card, ID bracelet, technical history; pen; x-ray machine control panel(s), tube, bucky, table, collimator, extension cones; technique chart; charts for conversion of technique, standard examination views, dosage, tube capacity; loaded cassettes or nonscreen film holders; vertical film stand; leaded rubber shielding; R and L and ID markers; immobilization devices; stool; chair; calipers; tape; scissors; stretcher or wheelchair; marking pen; protractor; tube for film roll

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-infant patient to be radiographed; radiologic technologist; radiologist; nurse

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Taking plain film radiographs of humerus and/or shoulder girdle of non-infant patient by reviewing request; reporting observed contraindications; reassuring patient; measuring parts; setting up for conventional or magnification technique; selecting and setting technical factors; identifying film; positioning patient and equipment for erect or recumbent exposure; providing shielding; collimating; making exposures; having radiographs processed and reviewed; repeating for full set of views or as ordered; having pt. returned; placing radiographs for use; recording examination.

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Performer receives or obtains the x-ray requisition form, patient's identification card, and any appropriate medical-technical history for a non-infant patient scheduled for radiography of the humerus (upper arm) and/or the shoulder girdle (shoulder joint, clavicle and scapula):

a. After checking assignment on schedule sheet.
b. From co-worker.
c. After having arranged requisitions in order of priority.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided:

   a. Performer checks the examinations called for including the parts involved, the affected side, whether bilateral or unilateral studies are ordered; notes the patient positions requested, whether recumbent, seated or standing, and the projections, number of exposures, central beam angulations and body rotations involved. Notes the areas of interest and joints to be included, whether known or suspected fractures are involved or destructive disease and the sites. Notes whether the use of a bucky will be involved.

OK-RP; RR; RR

6. Check here if this is a master sheet..(X)

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Notes any request for magnification. Checks the name of the referring physician.

b. Performer reads patient's name, identification number, sex, age, weight. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information that will affect patient positioning, technique, or handling of the patient, such as presence of fracture, suspected fracture, presence of plaster cast, splints (to be left in place or removed by a physician), whether patient will be on a stretcher or wheelchair, and any notation on the nature of any known pathology which would affect technique (such as bone infection), and the purpose of the study.

c. With humerus, notes whether the entire humerus or the upper or lower two-thirds is called for, whether both joints or the joint nearer injury is to be included.

d. For axial views of shoulder joint, makes sure that patient can and is allowed to abduct the affected arm at a near right angle to the long axis of the body. May check with MD. Notes whether it will be necessary to prepare a cylinder film holder to be used with patients not able to abduct arm. Notes whether a weight carrying view of acromioclavicular articulations is called for.

e. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, catheters or similar devices in place; whether patient will be accompanied by nurse or other staff person.

f. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved. Goes to examination room or control room for machine involved.

g. If magnification has been requested, performer checks that the machine to be used has a fractional focal spot of appropriate size for direct magnification technique (i.e. 0.3 mm or smaller). If patient will be in contact with the x-ray equipment (such as for sternoclavicular articulation) makes sure that equipment, particularly overhead system, is shock-proof.

h. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete. Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination. Notes shielding needed.

i. Depending on institutional procedures performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether number of radiographic exposures ordered or done in past should be brought to radiologist's attention.

j. Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.

k. If patient's record indicates orders for sedation, injection of local anesthetic, or any other prior medication performer may check timing to be sure a proper elapse of time has occurred for medication to take effect. May notify MD

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or RN when ready. May arrange to delay examination if appropriate.

1. If referring physician has requested that films already on file be sent with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer notifies supervisor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate and proceeds after obtaining needed information, signature, or orders.

3. When performer is clear about what will be involved in examination, he or she prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Performer reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).
   b. Performer washes hands as appropriate; depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
   c. Performer makes sure that x-ray equipment is ready for use. Goes to control panel for x-ray generator and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for machine to "warm up." If appropriate, performer may set radiography mode selector and set collimator control for manual operation.
   d. Performer checks that appropriate immobilization devices such as sandbags, wedge sponges, tape are present and that there is a mattress, pads, pillows and/or blankets for comfort of patient if patient will lie on table.
   e. Checks that there is leaded rubber shielding available in room to be used to mask film, protect the patient, and/or to place beneath the film holder, as appropriate.
   f. Performer prepares for identification of the films using equipment provided by institution:
      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
      iii) Checks identification against requisition sheet.
      iv) Performer makes sure that right (R) and left (L) markers are available for use.
   g. For weight carrying study performer obtains two weights of equal amount as ordered.
   h. For rolled film positioning performer obtains an appropriate film enclosed in a light-proof envelope, a small mailing tube and a pair of flexible fluorescent screens. Performer glues lead foil backing

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around tube as appropriate and marks center. Performer inserts flexible screens inside envelope with unexposed film. Centers loaded envelope to center of lead foil backing, curves around tube, and secures at each end.

4. If magnification has been requested, performer prepares the equipment for the tube-over-table method of magnification (used without bucky):
    a. Performer determines the degree of magnification requested on the requisition sheet; if the request is expressed as an area magnification performer determines the linear magnification by taking the square root. (Linear magnification squared equals area magnification.)
    b. Performer calculates the required distances from target (focal spot) to object (patient) (TOD), and from object to film (OFD), as well as the distance from target to film (TFD) (the sum of TOD and OFD):
        i) If the distance from the table top to a film holder placed on the floor or a stool (OFD) will be a relatively inflexible distance, performer measures this distance or reads indicator scale. (If stool is to be used, may note the table height.) Performer may adjust table height to provide for a round number for the OFD.
        ii) If the distance from the focal spot to the table top (TOD) will be the relatively inflexible distance, performer determines what this is by measuring or reading appropriate indicator scale on tube housing. Performer may adjust tube height to provide a round number for the TOD.

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        iii) Depending on whether the OFD or the TOD is fixed, performer calculates the required complementary distance by referring to a magnification chart for the degree of linear magnification required, or uses the formula: degree of linear magnification equals TFD divided by TOD. For a two-times linear magnification performer simply sets the TOD equal to the OFD.
        iv) Performer adjusts and locks the table height and/or the tube height to the calculated OFD and TOD.
    c. Performer aligns the object-film and target-object distances:
        i) Performer moves the x-ray tube housing until it is centered over the table top in the approximate area where the patient's anatomical area of interest will be positioned, such as on table or at head of table.
        ii) Performer swings the table out of the way so that there is no obstruction between the tube and the floor. (Does not change height.) If appropriate, places the stool on the floor under the tube. May place lead shielding on floor or on stool. May place film holder on floor or stool.
        iii) Selects the size film designated for the degree of magnification and the selected part to be studied.
        iv) Performer adjusts the collimation to correspond to the field size anticipated (for the TOD involved).
        v) Performer activates the light in the collimator and adjusts the tube horizontally so that the light beam cast is centered to the film holder or lead shield-

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ing on the stool or floor. Uses the cross-hairs projected by the beam to center the tube to the area on the floor or stool.

vi) Performer locks the tube into position so that there is a 90° angle of the beam with the floor or stool. Fixes and retains collimator setting.

vii) Performer marks the outline of the collimated light area or film holder on the floor or stool or on the lead shielding using tape or other removable marker. If not already done, checks by placing film holder in marked area. May mark center of area as shown by cross-hairs.

viii) Performer swings table back into place. Activates light beam in collimator and marks the table top where the center cross-hairs and light outline are projected (to be used to center the part to be radiographed). Uses tape or other radiolucent removable marker.

ix) Performer may recheck TOD and OFD to be sure that they correspond to the calculated distances.

d. For magnification technique using an upright film holder, performer may wait until patient has been brought into examination room. Adjusts upright holder to appropriate height; adjusts x-ray tube to right angle projection of beam to film holder; centers to the film;measures and adjusts TOD to patient's seated or standing position and marks patient's position; measures and adjusts OFD from patient's seated or standing position as marked.

e. If the sum of the new TOD and OFD (TFD) is now different from the TFD used for non-magnification technique, performer may consult technique chart to note the factor to use

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for a compensatory change in mAs. May record for later use in setting exposure factors.

f. Performer may also note the change in kVp and mAs necessary to compensate for any change in collimation from non-magnification technique. Consults appropriate charts for conversion factors. May record.

5. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

a. Depending on institutional arrangements performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

b. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

c. Has patient assume a comfortable position seated on table or chair. If patient is in wheelchair, moves patient in chair into position next to table. If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. Otherwise arranges if necessary to move patient to table or use upright film holder with patient remaining on stretcher.

d. Performer explains to patient what will be involved in the procedure;

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indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

e. Performer answers patient's non-medical questions honestly;attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains when asked medical questions that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

f. If patient has an IV drip in place, performer checks that needle has not become dislodged and that the fluid is dripping at an even rate. If there are any problems, performer clamps tube and notifies an appropriate staff person at once.

g. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs appropriate physician and proceeds only with approval.

6. Performer questions patient and/or RN or MD present on what movement is possible in the shoulder, the affected arm, and on the opposite side; may question patient about any injury or pain to determine what mobility is possible and what positions are available for use and whether to have patient standing, seated or recumbent.

a. If open to choice and possible, chooses erect position over recumbent. With cardiac condition chooses seated or recumbent position over standing position.

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b. Rules out erect positioning if examination of clavicle may involve fracture or destructive disease.

c. If movement is limited or fracture is suspected, performer decides on x-ray tube and patient positions to accomplish the radiography with a minimum of movement by the patient. May decide to use upright film holder in appropriate positions to accomplish this.

d. Performer considers the number and types of projections ordered for the examination and the patient's condition. Performer may consider a change from standard projections to better accomplish the purpose of the examination, or deletion of a position or a change in technical factors. Depending on institutional arrangements, performer may obtain permission from appropriate radiologist or decides personally to alter the standard procedure.

e. If not already done, has patient remove all jewelry; may arrange to have patient's belongings checked or decides to do personally. Makes sure female patient has a gown.

f. If there is an injured arm to be radiographed performer has patient remove sleeve from unaffected side before slipping sleeve off affected side. If there is a splint or cast on injured area, performer has RN or MD carry out any orders on removal. If there is a wet dressing, performer has it reinforced or decides to do personally.

7. Performer prepares for examination:

a. Performer selects speed and type of film depending on whether bucky, grid, cassettes or non-screen holders will be involved or as determined by institutional policy. Selects film sizes based on the size

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of the part and the number of exposures planned for each film. Considers the areas to be included on film, whether bilateral (side-by-side), and the needs of magnification technique.

b. Depending on the patient's mobility and the projections requested performer may choose flexible film holders, curved cassettes or rolled film. For bilateral shoulder study performer selects a cassette long enough to be used with the long axis parallel with the shoulder expanse or plans on the simultaneous exposure of two cassettes placed side-by-side.

c. Performer makes sure that an adequate supply of loaded cassettes or film holders of the types and sizes selected are available in the examination room. If not,arranges to obtain or decides to obtain personally.

d. Performer obtains the appropriate size loaded non-screen film holder or cassette for the first projection.

e. If several views will be taken on one film, performer mentally decides how these will be positioned so that the film need not be turned for viewing each image. Performer uses leaded rubber sheets and masks the film holder completely except for the area to be exposed. Performer treats the area to be exposed from this point as though it were the actual film size.

f. Performer attaches identification information to the film holder or table top:
   i) Places right or left marker on film holder or table-top as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.
   ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of film holder.

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   iii) If patient's identification information is to be entered by use of flasher, sets flashcard aside for later use with space created by piece of leaded rubber on appropriate edge of holder.
   iv) Performer may place patient's card into card tray for equipment using automatic film marking device.
   v) Where two cassettes are to be exposed simultaneously, performer marks both with R or L and identification information.

g. If cassette is to be used with bucky (under tabletop or in upright holder) performer manually pulls out bucky tray and opens retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.

h. If a bucky is not being used, performer places nonscreen film holder or cassette (except rolled film or curved cassette) in position on table top under patient, or where the part will be positioned, or in upright holder.
   i) May place leaded rubber sheet under nonscreen film holder.
   ii) If magnification technique is to be used performer places film holder or cassette in marked position on floor or stool.

i. Performer sets the focal-film distance appropriate for the position to be used (if not already done, as with magnification technique). Operates controls or manually moves the x-ray tube into place over the film holder (or at right angles to upright holder).Checks the focal-film

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distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.

j. Performer provides patient and everyone who will remain in room during exposure with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

8. Performer has patient assume a comfortable recumbent, seated, or standing position depending on the positions to be employed, so that the part(s) to be radiographed can be measured in position.
   a. If appropriate, places mattress, pillow or clean linen on x-ray table.
   b. Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way and may be collided with by patient.
   c. If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.
   d. For erect position performer adjusts the upright film holder so that it is at appropriate height when patient is sitting or standing in comfortable position for the projection.
   e. Depending on the positions to be radiographed performer uses centimeter calipers to measure the thickness of the part(s) in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors.
   f. After measuring has patient rest in as relaxed a position as possible.

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May place pad, blanket or pillow under bony prominances to provide comfort.

9. Performer selects the exposure factors for the first projection by consulting the technique chart(s) posted for the machine:
   a. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other accessories that are possible(such as screens, grid,bucky, etc.).
   b. Makes note of the kVp, mA,T(seconds of exposure time),focal spot size, and the focal film distance (TFD or FFD) called for.
   c. Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for a pathological condition, cast, a change in TFD, the preference of the radiologist involved, and any other conversion needed such as with magnification technique. Performer looks up numerical conversion factors and calculates or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies,divides, adds, or subtracts as appropriate.
   d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the

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technique to an equivalent output using higher kVp and lower mAs.

10. Performer sets exposure factors as selected:

    a. Enters control room. Makes sure that indicator light shows that x-ray generator is ready for use. Makes sure that all circuits have been stabilized.
    b. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.
    c. For conventional exposure control:
        i) Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.
        ii) Performer selects and sets the exposure time that will produce the mAs desired.
        iii) Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.
    d. For automatic phototimed exposure control:
        i) Performer selects and sets the category corresponding to the type of study and use or non-use of screens, bucky, etc., and, if appropriate, focal spot size.
        ii) Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).
        iii) May select and set a kVp range button, if called for with equipment, corresponding to kV range for the examination.
        iv) Sets a density selector corresponding to the usual (or special) requirements for the study.
        v) Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.
    e. Depending on the equipment, may set controls to provide for use of bucky, manual tableside adjustments of table and tube height, position, and of collimation (unless these have already been set as with magnification technique).

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11. Performer places the part to be radiographed in the final position selected for the first exposure. Makes sure that correct side and part are being positioned. For young patients may plan to film unaffected side for comparison. For studies of both the humerus and shoulder performer plans exposures so that there will be the least shifting around; that is, makes all similar standing, seated, supine and/or prone exposures together. Maintains positions which can be used for both humerus and shoulder(s). Performer may explain or demonstrate the positions required; may obtain help in positioning patient.

    Performer centers the part keeping the long axis of the part parallel to the film holder. When using a bucky centers patient to midline. With film holder or cassette on table top centers film to part. With upright holder adjusts height of holder to part and centers part to film. Positions as follows (unless nonconventional positioning is being used):

    a. For the humerus, performer makes sure that film size will permit projection of the entire area of interest with upper margin of film above the head of the humerus. Centers with reference to the lateral and medial epicondyles of the humerus and the acromion process of the scapula.

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i) For erect standing AP projection (to provide posterior view) or erect standing lateral projection, performer has patient stand comfortably before the film holder so that a true posterior or lateral view can be obtained. Centers to film holder. Performer locates the epicondyles. If possible, palpates with thumb and index finger and adjusts position of arm or has patient turn until the central ray will pass vertically through the center of part to the film in desired projection. Makes sure that all the areas of interest will be projected.

ii) For erect seated AP projection (posterior view), especially for distal humerus, performer has patient be seated at end of table on stool high enough for patient to extend arm over table with shoulder and elbow in same plane. Has patient rotate the upper arm externally. Centers film holder to humerus with long axis of film and part parallel.

iii) For erect seated lateral projection, especially for distal humerus, performer positions on stool as for AP projection. Has patient flex elbow 90° and rotate forearm until hand is in lateral position, thumb up. Centers as above.

iv) For recumbent AP projection (posterior view) performer has the patient lie in the supine position with long axis of humerus over center line of table. Has patient supinate the hand by rotating hand and forearm until palm is up. Performer elevates the opposite shoulder (or elevates the affected arm and cassette or film holder on sandbags) so that there is minimum part-film distance and the epicondyles are parallel with the plane of the film, with the long axes of both parallel to each other. Centers film to area of interest.

v) For recumbent lateral projection has patient lie on table as above. Has patient abduct the arm somewhat, flex the elbow, rotate forearm medially, and rest palm of hand on patient's thigh or side with epicondyles at right angles to the plane of the film. Centers film to area of interest.

vi) For decubitus lateral projection has patient lie on the unaffected side. Performer places the film holder or cassette between the affected humerus and the patient's torso as close to the axilla as possible. Centers the cassette to the arm. Has patient flex elbow and turn the thumb surface of the hand up. Performer has hand rest on a support or other hand. Adjusts patient's body so that the lateral surface of the arm is at right angles to the central ray.

vii) For transthoracic lateral projection of humerus and shoulder (either recumbent or erect), has patient sit, stand (or lie in supine position) with the injured arm at the side, with elbow flexed, and palm of hand against anterior chest. Has patient elevate opposite arm, with forearm resting on patient's head, and shoulder elevated as much as possible. Performer holds the humeral epicondyles and adjusts the patient's body so as to place the lateral as-

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pect of the humeral head parallel with the plane of the film and the epicondyles at right angles to the film. Centers film holder to the area of interest. May direct ray through the surgical neck of the humerus to center of film

b. For the shoulder performer notes the positions involved and whether bilateral; notes whether body rotation, use of rolled film and/or use of weights is involved. Makes sure not to position for axial projections until advisability of doing so has been verified.

i) For the erect or supine AP projection (posterior view), performer notes whether external, neutral and/or internal rotation is involved. Centers to the coracoid process, and rotates patient so that the blade of the scapula is parallel with the plane of the film. If patient is supine, supports elevated shoulder and hip. Performer locates the epicondyles and holds between thumb and index finger of one hand while adjusting the arm.

With external rotation has patient turn palm forward. Abducts arm slightly so that the coronal plane of the epicondyles is parallel with plane of film. Supports as needed. With neutral rotation has patient rest palm of hand against thigh. With internal rotation has patient flex elbow somewhat, rotate arm internally, and rest back of hand on hip. Adjusts arm so that the coronal plane of the epicondyles is perpendicular to the plane of the film.

Performer directs the central ray at right angles to the coracoid

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process. For infrasupinatus insertion in external rotation has ray enter at 25° caudad; for subacromial space employs an angle of 15°.

ii) For erect or supine view of the teres minor insertion, performer exaggerates the AP internal rotation position, as described above, with hand moved to patient's back; centers about one inch distal to coracoid process. Directs central ray to head of humerus.

iii) For seated or standing superoinferior projection of the bicipital groove, has patient stand or sit facing the end of the table. Has patient flex elbow, lean forward, and rest forearm on table with hand supinated. Places cassette on forearm with long side parallel with long axis of forearm. Asks patient to close fingers over the end of cassette. Uses sandbag to adjust cassette to horizontal position. Has patient lean until humerus is 10° to 15° from the vertical, opened backward. Palpates and marks the bicipital groove and directs the central ray to the mark. When opposite side is to be radiographed, too, centers to unmasked half of cassette and repeats on other side with second exposure on film.

iv) For supine or erect profile view of the glenoid fossa, performer centers to the joint, rotates the body about 45° towards the affected side. With supine patient supports the elevated shoulder and hip. Performer adjusts the degree of rotation so that the scapula is parallel with the plane of the film and

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the humerus rests against film. For internal rotation abducts arm slightly and places hand against side of body. Directs central ray at right angles somewhat medial and distal to the upper, outer border of shoulder.

v) For supine posterior view of the subscapularis insertion, adjusts patient's arms along the sides of supine body with head resting on table.Centers to shoulder joint. Elevates the unaffected shoulder about 15°. Abducts the affected arm so that it is at right angles to the body. Has patient flex the elbow and pronate the hand. Supports and immobilizes hand. Centers vertical central ray to the shoulder joint.

vi) For supine inferosuperior projection of coracoid process, starts to position body as for v, above, centering 1 to 2 inches proximal to the coracoid process. Adjusts shoulders to lie in the same transverse plane; abducts affected arm slightly and has patient supinate the hand. Directs central ray to the coracoid process at 15° to 30° cephalad,with the greater angulation reserved for patients who are round-shouldered.

vii) For seated superoinferior axial projection of the shoulder joint, performer seats patient sideways at end of table with shoulder at midline, or on a stool or chair permitting patient to extend affected shoulder well over cassette placed near end of table parallel with long axis. Has patient lean over cassette until shoulder joint is centered over film. Has patient rest elbow of affected side on table,flex,and abduct the arm so that it is at

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right angles with the long axis of body. Places thumb side of hand up. Has patient tilt head towards unaffected shoulder. Adjusts body to eliminate forward or backward leaning. May elevate cassette on sandbags; may use curved cassette. Supports as needed. Centers. Directs central ray to joint at 20° to 25" towards elbow.

viii) For seated or supine inferosuperior axial projection of the shoulder joint,has patient abduct arm of affected side at right angles to body and flex elbow. With supine patient elevates head and shoulders 3 to 4 inches and supports arm. Keeps hand and wrist in lateral position. Has patient grasp a support or supports hand. Has patient turn head away from affected side. Performer places cassette on edge above shoulder as close as possible to neck.Supports cassette or tapes into place. Directs ray (horizontally for supine patient) through the axilla to the acromioclavicular articulation.

ix) For seated or supine rolled-film axial projection of shoulder joint,performer obtains film rolled on tube prepared earlier. Has patient seated sideways at end of table or supine. Has patient supinate hand and rest it in lap if seated. Places film roll as high in the axilla as possible,adjusted at right angles to table for supine patient and horizontal for seated patient. Has patient brace arm to hold roll in position. Directs central ray at right angles to acromioclavicular joint or 5° medial or lateral,

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depending on the interest in the bicipital groove or coracoid process.

x) For seated or standing horizontal transaxilla projection of shoulder joint, performer uses vertical cassette holder that will accommodate the patient's head and neck beside the stand and positions patient seated or standing with affected shoulder centered frontally to the cassette. Performer has patient lean directly forward and rest the upper border of the shoulder against cassette, resting head and neck beside holder. Directs the central ray horizontally through the axilla region.

xi) For seated semiaxial anteroposterior projection of glenohumeral joint (or semiaxial view of clavicle and scapular spine), performer places cassette at edge of table and seats patient with back toward and resting against cassette and edge of end of table. Has patient sit erect. Provides any needed support for forearm without affecting position. Centers cassette to glenohumeral joint and supports on sandbags if needed to elevate to middorsal area. (For clavicle and scapular spine adjusts and supports cassette with 45° wedge.) Directs central ray to the coracoid process (or clavicle and/or scapular spine) at 40° to 45° caudad.

xii) For seated or standing bilateral AP or PA projections of acromioclavicular articulations, performer notes whether weight carrying projections are requested. If so, prepares for unencumbered exposure first, followed by weight carrying exposure.

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Performer uses long cassette crosswise in upright holder or has two cassettes placed together for wide subjects for simultaneous exposure. Performer has patient seated or standing in AP or PA position before holder, centered to the acromioclavicular joints, with median sagittal plane of body at midline of cassette (or between cassettes). Has patient distribute weight equally on both feet or on chair. Has patient rest chest or back against cassette(s) for support, with arms hanging by side unsupported. Adjusts so that shoulders are in the same transverse plane. Directs central ray at right angles to midline of body at the level of the centered joints. For second, weight carrying exposure has patient hold objects of equal weight in each hand with shoulders hanging relaxed and repeats exposure with second cassette(s).

xiii) For seated or standing unilateral AP projection of acromioclavicular articulation, has patient turn back toward upright cassette holder while seated or standing. Centers to affected shoulder at the level of the joint and the coracoid process and directs central ray there at 15° cephalad.

xiv) For seated or standing lateral projection of acromioclavicular articulation, has patient face upright cassette holder while seated or standing. Has patient place hand of affected side up under the unaffected-side axilla. Rotates the un-

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affected side 30° to 35° away from film. Centers to the medial border of the head of the humerus. Instructs patient to grasp the side of the cassette stand and pull affected shoulder firmly against it when ordered, just before exposure. May have patient practice this. Directs central ray at 15° caudad.

c. For the clavicle and sternoclavicular articulation, performer makes sure that there is no danger of fragment displacement or injury or presence of destructive disease before using erect positions. Notes whether bilateral views are requested. Where lordotic position is called for makes sure that patient can assume this position. If not, selects alternative axial projection. Makes sure that patient is rehearsed for complicated procedures, such as with lateromedial bilateral body-contact projection of sternoclavicular articulation (for which performer makes two exposures without movement of the part or film).

  i) For prone or erect PA projection of clavicle (AP view) and semiaxial projection, performer adjusts patient's body so that the clavicle is centered to the midline of table or cassette holder at the level of coracoid process with arms alongside of body and shoulders in a single transverse plane. Directs central ray at right angles to film. For semiaxial projection directs central ray to the supraclavicular fossa at 25° to 30° caudad.

  ii) For paired right-angle projections of the clavicle, performer has patient assume prone position and centers to clavicle. Arranges body as for PA projection. Rests head on cheek of affected side. Performer marks table or cassette tunnel beside shoulder at a point in line with midpoint of clavicle. For first exposure directs central ray to midpoint of clavicle at 45° caudad. Has patient retain position. For second exposure inserts cassette and directs central ray to same point at 45° cephalad.

  iii) For supine superoinferior axial projection of clavicle, elevates patient's head 2 to 3 inches and has arms placed alongside body. Depresses shoulders so that clavicle is in transverse plane and has patient turn head away from affected side. Performer places the cassette on edge at the top of the shoulders close to the neck and supports it. Adjusts tube so that central ray will pass between the clavicle and chest wall as close to 40° to film as possible. May adjust angle 15° to 25° outward for medial third of clavicle.

  iv) For seated or standing AP lordotic axial projection of clavicle, performer has patient stand or sit with back to a verticle cassette holder. Centers to the affected shoulder. Assists patient to achieve concavity of the lumbar spine as seen from the side and outward convexity of the part. First has patient place hands in comfortable position such as clasped over abdomen. Supports lumbar region with hand and has patient lean backward and rest neck and shoulder against cassette, with neck flexed. Performer adjusts the degree of

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leaning until oronal plane of clavicle is nearly at right angles to film. Directs central ray to inferior border of clavicle at right angles to its coronal plane. Performer has patient become erect and relax again until performer is ready to make exposure;then has position repeated.

v) For seated axial projection of clavicle,performer has patient seated facing end of table. Puts gonadal shielding in place and then places pillow or blankets on patient's lap so that a cassette can be placed on top at level of diaphragm. Centers cassette to affected shoulder and has patient hold cassette or secures into position. Asks patient to lean forward slightly. May have patient rest head on sandbags placed on edge of table. Directs central ray anteriorly at 90° to coronal plane of clavicle.

vi) For bilateral or unilateral PA projection of sternoclavicular articulation with body rotation, performer has patient assume a prone position on table or stand or sit facing upright holder with arms alongside body. May place forearms above head for inferior portion of the articulation. Centers to midline. For unilateral study may turn patient's head towards the affected side. Centers to the manubrial notch and directs central ray at right angles through the third thoracic vertebra. For bilateral study does not have patient turn head. Centers as above and directs beam as above.

vii) For composite lateromedial bilateral body-contact projection of the sternoclavicular articulation performer has patient lie on table in a prone position with arms alongside body and head not turned. Performer marks the spinous process of the 3rd thoracic vertebra and marks a point 6cm. on each side of this first mark. Centers to manubrial notch. Performer explains to patient that position is to be held for two exposures, one after the other,without the film being changed. Makes sure that equipment is shockproof and places tube aperture in contact with the body for each exposure at the point of entry for central ray. For first exposure directs central ray at 5° towards the midline to the second mark (6cm. from the spinous process) and places tube in contact with body. Does not change film after exposure. For second exposure directs central ray at 5° toward the midline on the other side to the third mark (6cm. from the spinous process on other side) and places tube in contact with the body.

viii) For PA oblique projection of sternoclavicular articulation, performer has patient assume a prone position on table or stand or sit facing upright holder with joint being examined centered. Positions body or elevates unaffected side so that the midsagittal plane of the head and body is at right angles with film. Has prone patient flex knee and elbow of elevated side for support. Directs central ray at right angles through sternoclavicular articulation.

ix) For lateral recumbent projection of sternoclavicular articulation, has patient take lateral recum-

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bent position on the affected side. Centers. Has patient extend the arm on the affected side and grasp the end of the table. Has patient place other arm on superior surface of body and grasp dorsal surface of hip so that shoulder is held in depressed position. Directs central ray 15° caudad through lower sternoclavicular articulation.

x) For lateral erect projection of sternoclavicular articulation, has patient stand with body at right angles to upright cassette holder, centered to manubrial notch. Has patient fold arms behind back and stand straight, with chin slightly extended. Rotates shoulders back and checks that they are level. Directs central ray horizontally to center of film.

d. For the scapula, performer selects or checks orders for erect or recumbent positioning.

i) For AP projection of scapula (posterior view), performer chooses seated, standing or supine position. Centers to the affected scapula. Performer abducts the arm on the affected side at right angles to body so that the scapula is drawn outward. Has patient flex elbow. Supports hand. Does not have body rotate. Directs central ray at right angles to midscapular area including acromion process and apex of scapula.

ii) For oblique AP or lateral projection of scapula, performer chooses supine, seated, or standing position. Has patient sit, stand or lie in AP position and centers to the scapula. For oblique AP projection has patient extend arm upward, flex

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elbow and place hand supinated under head. Has patient turn away from the affected side. For oblique lateral projection has patient raise arm and rest flexed elbow against forehead. Performer grasps axillary and vertebrae borders of scapula between thumb and index fingers of hand and adjusts rotation away from affected side so as to project scapula free of rib cage. Directs central ray at right angles to lateral border of rib cage at mid-scapular area.

iii) For lateral projection of scapula performer chooses seated or standing position facing cassette holder centered to scapula. Has patient place affected shoulder against cassette holder, flex elbow, and place arm behind, with back of hand against posterior ribs or drawn across chest. Has patient raise opposite arm and grasp edge of holder with hand, rolling the shoulder anteriorly. Rotates body until flat surface of scapula is at right angles to film and centered. Performer may have affected arm extended upward and with forearm resting on head to demonstrate acromion and coracoid processes. May have affected arm hang beside body to demonstrate glenohumeral joint. Directs central ray horizontally to the medial border of the protruding scapula.

iv) For oblique projection, performer chooses seated, standing, or lateral recumbent position. Places patient in lateral position. Abducts arm at right angles to long axis of body with elbow flexed and hand against

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patient's head or has patient extend affected arm obliquely upward with hand against head. Rotates body somewhat forward and has patient grasp table or holder for support. Directs central ray at right angles to film between chest wall and mid-area of protruding scapula.

v) For supine or prone tangential projection of scapular spine, performer centers to shoulder. With supine position rotates patient so that wing of scapula is parallel with table by elevating opposite shoulder. Has patient turn head away from affected part. For prone position has patient place arms along sides of body and adjusts shoulders to lie in a single transverse plane. Has patient rest head on chin and supinate hand on affected side. Uses wedge to elevate shoulder and upper arm until scapula is parallel with table. Performer directs central ray through scapular spine at 45° caudad for supine and 45° cephalad for prone patient.

vi) For standing tangential projection of scapula spine, performer uses a vertical cassette holder that will accommodate patient's head at the side. For seated projection, performer seats patient in front of cassette holder with back toward and resting against end of table. Centers to shoulder. Has standing patient lean forward at a 45° angle and rest shoulder against cassette, with head resting at the side. For seated patient places and centers cassette at end of table adjusted to an angle of 45° with sandbags or wedge. Directs central ray at right angles to film

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through the anterosuperior aspect of shoulder at a posteroinferior angle of 45°.

e. If, during positioning, patient shows signs of severe pain, performer may notify appropriate physician at once and await orders or may decide on alternative positioning to avoid movement of the affected part.

12. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size (or the size of the unshielded area of the film to be exposed). Uses cross-hair shadows as reference for center of field. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired. May readjust tube position lengthwise or crosswise to provide better centering.

13. Once the patient has been positioned and immobilized performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). For small fields performer may attach auxiliary extension cone to collimator to further reduce the primary beam.

14. Performer may add lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that protective shielding has been provided to patient and everyone who will remain in room.

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15. Throughout procedure performer observes patient for any signs of emergency and/or to prevent or respond to an accident. With fractured humerus or shoulder girdle is alert to signs of nausea, dizziness, or sweat, suggesting faintness. Performer may have patient lie down, lower head or raise legs. Notifies nurse. If patient shows any other emergency signs, loses consciousness, or has an accident, performer calls appropriate physician or nurse at once. May decide to provide emergency first aid as well.

16. When everything is ready for the exposure, performer explains to patient what breath control will be used for exposure such as holding breath, breathing in and holding, or breathing out and holding, when told to do so by performer and until told to relax. Has patient prepare to breathe in and hold for lateral transthoracic, right-angle clavicle, lordotic axial, lateral sternoclavicular articulation, and AP scapula projections. Has patient exhale and hold for shoulder views such as AP projection, teres minor insertion, bicipital groove, subscapularis insertion, coracoid process, glenoid fossa, axial projections, and for PA projections of clavicle and sternoclavicular articulation. Has patient prepare to hold breath for all others. Reminds patient about those exposures in which position is to be retained for a second exposure. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

17. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to take a deep breath, exhale, and/or hold still by calling or using intercom. Performer initiates exposure by pressing hand trigger or exposure control button.

    a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
    b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.
    c. With phototimer notes whether backup timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure (due to underexposure if premature cut-off, or overexposure due to faulty timer).
    d. After exposure is completed tells patient that he or she can relax.
    e. If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

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18. Performer returns to patient. Removes cassette or film holder from table, floor or bucky.

    a. Removes any markers for further use. If multiple views are to be taken on the film, removes leaded rubber mask and remasks all but next area to be exposed.
    b. If the patient is being examined for a possible fracture or if so requested, performer arranges to have the first exposure processed at once and brought to the appropriate radiologist.
    c. Depending on whether radiologist will evaluate radiographs before

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completion of all possible exposures for the series, performer arranges to process film(s) and evaluate for quality control personally, have this done, or bring to darkroom for processing and later evaluation, based on time available, institutional arrangements or specific instructions. Attaches ID card for use with flasher if appropriate. May sign requisition.

d. While films are being processed and/or evaluated performer has patient relax in examination room or holding area. Explains what will happen next.
   - i) Performer determines whether patient should remain on table and/or in room or requires observation. May consult requisition sheet or attending RN. If appropriate, makes sure that patient will be attended while waiting.
   - ii) If appropriate, moves x-ray tube and any protruding film holder away from patient before patient rises.
   - iii) May decide to assist patient to chair or stretcher or from table. Makes sure patient is reminded of any footrest in stepping off table.

19. When (or if) performer learns from the radiologist the extent of the injury and/or whether further conventional views and/or positions can be undertaken, eliminated or altered, performer proceeds as appropriate according to instructions.

a. For further exposures performer repeats appropriate steps for next view(s) including identification of film holder or cassette and use or R-L marker, selection and setting of technique for next view (if different), positioning patient and equipment for focus-object-film alignment, proper collimation and shielding, and making exposure, as described above.

b. Performer refrains from commenting on the films or providing any interpretation.

c. If performer is asked to repeat any exposures, makes sure that the additional exposures are warranted medically, since additional radiation will be incurred.
   - i) Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."
   - ii) If request for retakes reflects malfunctioning equipment performer reports malfunction to appropriate staff member.
   - iii) If request for retakes reflects the preference for density or contrast of a radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.

20. When performer is sure that the examination has been completed, performer may have patient transported back to holding area or next location or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient as described above.

21. Performer carries out termination steps for the examination:

a. Performer has equipment and examination table cleaned after use or decides to do personally, depending on institutional arrangements.

b. Performer records the examination according to institutional proce-

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dures. May include date, room, examination type, the views taken, the technical factors used and film sizes; may record the number of exposures made of each view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. If any views called for in the initial request could not be obtained, performer may record reasons. Signs requisition sheet. c. Performer may decide to jacket films, requisition sheets, and related materials and/or have information recorded in log book, or has this done, depending on institutional procedures. d. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

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1. **What is the output of this task? (Be sure this is broad enough to be repeatable.)**

Requisition reviewed;pt. reassured,positioned,measured;technical factors selected and set;film identified;technique for multiple views and/or magnification set up;exposures made;radiographs sent for processing and evaluation;procedures repeated as appropriate for full set of views;patient returned; examination recorded;radiographs placed for use.

2. **What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)**

Pt.'s x-ray requisition sheet,ID card,ID bracelet, technical history;pen;x-ray machine control panel(s), tube,table,collimator,extension cones;technique chart;charts for conversion of technique,standard examination views,dosage,tube capacity;cassettes or non-screen film holders;vertical film stand;leaded rubber shielding;R and L and ID markers;immobilization devices;chair;stool;cal[illegible]rs;tape;scissors;bandage;stretcher or wheelchair;[illegible] tunnel;weight-bearing bench

3. **Is there a recipient, respondent or co-worker involved in the task?** Yes...(X) No...( )

4. **If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.**

Non-pediatric patient to be radiographed;radiologic technologist; radiologist; nurse

5. **Name the task so that the answers to questions 1-4 are reflected. Underline essential words.**

Taking plain film radiographs of toes,foot and/or ankle joint of non-pediatric patient by reviewing request;reporting observed contraindications;reassuring pt.;measuring part;setting up for multiple views and/or magnification technique;selecting and setting technical factors;identifying film;positioning pt.and equipment for erect or recumbent views;providing shielding;collimating;making exposures;having radiographs processed and reviewed;repeating for full set of views or as ordered;having pt. returned;placing radiographs for use;recording examination.

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Performer receives or obtains the x-ray requisition form, patient's identification card, and any appropriate medical-technical history for a non-pediatric patient scheduled for radiography of the toes, feet or ankle joint:

a. After checking assignment on schedule sheet.
b. From co-worker.
c. After having arranged requisitions in order of priority.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided.

   a. Performer checks the examinations called for including the parts involved, the affected side, whether bilateral or unilateral studies, the requested patient positions and views, the number of exposures, the central beam angulation, the area of interest to be included, whether foreign body localization or fracture fragment alignment is required, whether weight-bearing views are requested. Notes any request for magnification. Checks the name of the referring physician.
   b. Performer reads patient's name,identification number, sex, age, weight. Notes whether patient is in-pa-

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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tient, out patient, or emergency patient. Notes any special information that will affect patient positioning, technique, or handling of the patient, such as presence of fracture, suspected fracture, presence of plaster cast, splints (to be left in place or removed by a staff physician), whether patient will be on a stretcher or wheelchair, and any notation on the nature of any known pathology which would affect technique (such as bone infection), and the purpose of the study.

c. With foreign body notes suspected location and entry site. With stress study of ankle notes whether orthopedic surgeon or physician will inject local anesthetic and/or position patient. Notes whether special accessories such as film tunnel, special weight bearing bench with film slot will be required.

d. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, catheters or similar devices in place; whether patient will be accompanied by nurse or other staff person.

e. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved. Goes to examination room or control room for machine involved.

f. If magnification has been requested, performer checks that the machine to be used has a fractional focal spot of appropriate size for direct magnification technique (i.e. 0.3 mm or smaller). If patient will be standing on bench or table top (such as for weight bearing studies) makes sure that equipment, particularly overhead system, is shock-proof.

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g. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete. Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

h. Depending on institutional procedures performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether amount of exposures ordered or done in the past should be brought to radiologist's attention.

i. Depending on institutional procedures performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus. Notes shielding needed.

j. If patient's record indicates orders for sedation, injection of local anesthetic or any other prior medication performer may check timing to be sure a proper elapse of time has occurred for medication to take effect. May notify MD or RN when ready. May arrange to delay examination if appropriate.

k. If referring physician has requested that films already on file be sent with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer notifies super-

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visor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate and proceeds after obtaining needed information, signature, or orders.

3. When performer is clear about what will be involved in examination, he or she prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Performer reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accomodation for change in machine output or a policy decision).
   b. Performer washes hands as appropriate; depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
   c. Performer makes sure that x-ray equipment is ready for use. Goes to control panel for x-ray generator and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for machine to "warm up." If appropriate, performer may set radiography mode selector and set collimator control for manual operation.
   d. Performer checks that appropriate immobilization devices such as sandbags, wedge sponges, gauze bandage, tape are present and that there is a mattress, pads, pillows and/or blankets for comfort of patient if patient will lie on table.
   e. Checks that there is leaded rubber shielding available in room to be used to mask film, protect the patient, and/or to place beneath the film holder, as appropriate.

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   f. Performer prepares for identification of the films using equipment provided by institution:
      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
      iii) Checks identification against requisition sheet.
      iv) Performer makes sure that right (R) and left (L) markers are available for use.
   g. For weight bearing studies of the foot performer obtains a low bench constructed with a slot in the center to hold film holder upright while patient stands with feet together on either side of film holder, or prepares such a bench by taping blocks together to elevate feet to tube level and support film holder and lead mat. For subtalar joint studies performer may obtain a film tunnel (to permit several separate exposures without repositioning the foot).

4. If magnification has been requested, performer prepares the equipment for the tube-over table method of magnification:

   a. Performer determines the degree of magnification requested on the requisition sheet; if the request is expressed as an area magnification performer determines the linear magnification by taking the square

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root. (Linear magnification squared equals area magnification.)

b. Performer calculates the required distances from target (focal spot) to object (patient) (TOD), and from object to film (OFD), as well as the distance from target to film (TFD) (the sum of TOD and OFD):

i) If the distance from the table top to a film holder placed on the floor or a stool (OFD) will be a relatively inflexible distance, performer measures this distance or reads indicator scale. (If stool is to be used, may note the table height.) Performer may adjust table height to provide for a round number for the OFD.

ii) If the distance from the focal spot to the table top (TOD) will be the relatively inflexible distance, performer determines what this is by measuring or reading appropriate indicator scale on tube housing. Performer may adjust tube height to provide a round number for the TOD.

iii) Depending on whether the OFD or the TOD is fixed, performer calculates the required complementary distance by referring to a magnification chart for the degree of linear magnification required, or uses the formula: degree of linear magnification equals TFD divided by TOD. For a two-times linear magnification performer simply sets the TOD equal to the OFD.

iv) Performer adjusts and locks the table height and/or the tube height to the calculated OFD and TOD.

c. Performer aligns the object-film and target-object distances:

i) Performer moves the x-ray tube housing until it is centered

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over the table top in the approximate area where the patient's area of interest will be positioned, such as on table.

ii) Performer swings the table out of the way so that there is no obstruction between the tube and the floor. (Does not change height.) If appropriate, places a stool on the floor under the tube. May place lead shielding on floor or on stool. May place film holder of appropriate size on floor or stool. Performer selects the size film designated for the degree of magnification and the selected part to be studied.

iii) Performer adjusts the collimation to correspond to the field size anticipated (for the TOD involved).

iv) Performer activates the light in the collimator and adjusts the tube horizontally so that the light beam cast is centered to the film holder or lead shielding on the stool or floor. Uses the cross-hairs projected by the beam to center the tube to the area on the floor or stool.

v) Performer locks the tube into position so that there is a 90° angle of the beam with the floor or stool. Fixes and retains collimator setting.

vi) Performer marks the outline of the collimated light area or film holder on the floor or stool or on the lead shielding using tape or other removable marker. If not already done, checks by placing film holder in marked area. May mark center of area as shown by cross-hairs.

vii) Performer swings table back into place. Activates light beam in

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collimator and marks the table top where the center cross-hairs and light outline are projected (to be used to center the part to be radiographed). Uses tape or other radiolucent removable marker.

viii) Performer may recheck TOD and OFD to be sure that they correspond to the calculated distances.

d. For magnification technique using a vertical film holder, performer may wait until patient has been brought into examination room. Adjusts upright holder to appropriate height; adjusts x-ray tube to right angle projection of beam to film holder; centers to the film; measures and adjusts TOD to patient's position and marks patient's position; measures and adjusts OFD from patient's position as marked.

e. If the sum of the new TOD and OFD (TFD) is now different from the TFD used for non-magnification technique, performer may consult technique chart to note the factor to use for a compensatory change in mAs. May record for later use in setting exposure factors.

f. Performer may also note the change in kVp and mAs necessary to compensate for any change in collimation from non-magnification technique. Consults appropriate charts for conversion factors. May record.

5. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

a. Depending on institutional arrangements performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

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b. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

c. Has patient assume a comfortable position seated on table or chair. If patient is in wheelchair, moves patient in chair into position next to table. If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. Otherwise arranges if necessary to move patient to table or use upright film holder with patient remaining on stretcher.

d. Performer explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

e. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains when asked medical questions that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

f. If patient has an IV drip in place, performer checks that needle has not become dislodged and that the fluid is dripping at an even rate. If there are any problems, perform-

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er clamps tube and notifies appropriate staff member at once.

g. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs appropriate physician and proceeds only with approval.

6. Performer questions patient and/or RN or MD present on what movement is possible in the affected extremity and on the opposite side; may question patient about any injury or pain to determine what mobility is possible and what positions are available for use.

   a. Performer evaluates whether patient should be seated on a chair on x-ray table or on floor, or should be recumbent on table. With cardiac condition chooses seated or recumbent position over standing position.
   b. Performer evaluates whether patient can tolerate having the affected part placed flat on film holder or requires alternative positioning with use of an angulation block.
   c. Determines whether conventional flexion can be utilized in the joints involved, and whether film holders can be placed in conventional positions or need to be used in upright holders or supported by angle wedges. If movement is limited or fracture is suspected, performer decides on alternative x-ray tube and patient positions to use to accomplish the equivalent radiography with a minimum of movement by the patient. May decide to use upright film holder in appropriate positions to accomplish this.
   d. Performer considers the number and types of projections ordered for the

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examination and the patient's condition. Performer may consider a change from standard projections to better accomplish the purpose of the examination, or deletion of a position or a change in technical factors. Depending on institutional arrangements, performer may obtain permission from appropriate radiologist or decides personally to alter the standard procedure.

7. Performer selects speed, type of film, cassette or nonscreen film holders, or prepared packets of dental or occlusal film, depending on institutional practice; selects film and holder sizes based on the size of the part and the number of exposures planned for each film. Considers the areas to be included on film, whether bilateral (side-by-side), and the needs of magnification technique. Performer makes sure that an adequate supply of loaded cassettes or film holders of the sizes selected are available in the examination room. If not, arranges to obtain or decides to obtain personally.

8. Performer prepares for the examination:

   a. Performer obtains the appropriate size loaded non-screen film holder or cassette for the first projection.
   b. If several views will be taken on one film, performer mentally decides how these will be positioned so that the film need not be turned for viewing each image. Performer uses leaded rubber sheets and masks the film holder completely except for the area to be exposed. For weight bearing studies of the foot performer masks the lower half of the film holder. Performer treats the area to be exposed from this

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point as though it were the actual film size.

c. Performer attaches identification information to the film holder or table top:
   i) Places right or left marker on film holder or table-top as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.
   ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of film holder.
   iii) If patient's identification information is to be entered by use of flasher, sets flashcard aside for later use with space created by piece of leaded rubber on appropriate edge of holder.
   iv) Performer may place patient's card into card tray for equipment using automatic film marking device.

d. Performer places the film holder in a position that can be comfortably reached by the patient in final positioning. May place leaded rubber sheet under film holder.
   i) If magnification technique is to be used, performer places film holder in marked position on floor or stool.
   ii) If appropriate to make possible minimal movement of patient, performer may place upright holder at right angles to table top or in other position to hold film.

e. If not already done, has patient remove shoes and hose from both feet; may arrange to have patient's belongings checked or decides to do personally.

f. If the study relates to a single toe, performer may tape or use

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gauze to hold the toe or toes other than the one being examined in a flexed position to avoid being superimposed in the view.

g. If there is a splint or cast on an injured area, performer has RN or MD carry out any orders on removal. If there is a wet dressing, performer has it reinforced or decides to do personally.

h. Performer provides patient and everyone who will remain in room during exposure with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

9. Performer has patient assume a comfortable recumbent, seated, or standing position depending on the positions to be employed, so that the part(s) to be radiographed can be measured in position.

   a. If appropriate, places mattress, pillow or clean linen on x-ray table.
   b. Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way and may be collided with by patient.
   c. If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.
   d. Performer uses centimeter calipers to measure the thickness of the part(s) to be radiographed in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors.

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e. After measuring, has patient rest in as relaxed a position as possible. May place pad, blanket or pillow under bony prominances to provide comfort.

10. Performer selects the exposure factors for the first projection by consulting the technique chart(s) posted for the machine:

    a. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other accessories.
    b. Makes note of the kVp, mA, T(seconds of exposure time), focal spot size, and the focal film distance (TFD or FFD) called for.
    c. Once the standard kVp, mA and time are determined, performer notes whether any conversions are necessary to account for a pathological condition, a change in TFD, the preference of the radiologist involved, and any other conversion needed such as with magnification technique. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate.
    d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

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11. Performer sets exposure factors as selected:

    a. Enters control room. Makes sure that indicator light shows that x-ray generator is ready for use. Makes sure that all circuits have been stabilized.
    b. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.
    c. Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.
    d. Performer selects and sets the exposure time that will produce the mAs desired.
    e. Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.
    f. Depending on the equipment, may set controls to provide for manual tableside adjustment of table and tube height, position, and of collimation (unless these have already been set, as with magnification technique).
    g. Performer returns to overhead unit and sets the focal-film distance (if not already done, as with magnification technique). Operates controls or manually moves the x-ray tube into place over the film holder (or at right angles to upright holder). Checks the focal-film distance by reading indicator scale in the tube housing; adju[illegible] up or down until the required [illegible] is obtained.

12. Performer places the part to be radiographed in the final position selected for the first exposure. Makes sure that correct foot and part are

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being positioned. For young patients may plan to film unaffected side for comparison. Centers part and keeps the long axis of the part parallel to the film holder. May explain or demonstrate to patient what is required. May obtain help in positioning. Positions as follows (unless nonconventional positioning is being used):

a. For the toes, performer centers with reference to the distal ends of the metatarsal bones so that the central ray will enter the film vertically at the second metatarsophalangeal joint of an affected toe or of the third toe if all the toes are to be radiographed.

   Performer has the patient lie in a prone or supine position, depending on the projection, or seated appropriately.
   - i) For AP or dorsoplantar (superior surface of foot-to-sole) projection (posterior or plantodorsal view) performer has the patient flex the knee and place the sole of the foot on the film holder so that the particular toe (or all the toes) is (are) centered on the film holder (or the unmasked area). May use sponge between knees and/or compression band to support and immobilize. Performer may place a 15° foam wedge under the foot and above the film holder so that the toes are elevated near the base of the wedge.
   - ii) For PA or plantodorsal (sole of foot-to-superior surface) projection (anterior or dorsoplantar view) performer has patient assume a prone position with the toes elevated on small sandbags so that the toes are in a horizontal plane.

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Performer places film holder under toes with midline parallel to the long axis of the foot and centered appropriately.
   - iii) For oblique projection performer positions as for AP projection. Then has patient rotate foot and leg internally or externally for 45° depending on the toe(s) involved. May use a foam wedge. Supports elevated heel with sandbag and immobilizes.
   - iv) For a lateral projection performer has the patient assume a lateral recumbent position on the unaffected side. Has patient extend the affected extremity while performer supports with sandbags. With great toe performer rotates the foot as necessary to obtain a true lateral position; immobilizes. For lesser toes, adjusts to true lateral position on film holder or places the film packet of dental or occlusal film, pebbled side up, between the toe being examined and the lower adjacent toe; adjusts foot so that toe and film are in horizontal position and supports elevated heel.

b. For the first metatarsophalangeal joint and sesamoid bones, performer centers with reference to the first metatarsophalangeal joint.
   - i) For axial projection performer has patient lie prone on the x-ray table. Elevates the ankle on the affected side and puts a folded towel or pad under the knee. Has patient rest the great toe on the table while dorsiflexing the first joint. Adjusts so that the ball of the foot is at right angles to the long axis of the big toe. Performer places a packet of oc-

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clusal film in contact with the undersurface of the ball of the foot, centers, and supports with a sandbag.

Performer may seat the patient on the table and adjust foot so that the medial border is vertical and the sole of the foot is at a 75° angle with the film holder. Performer has patient flex toes and tapes into position.

ii) For lateromedial projection performer has patient lie in a lateral recumbent position on the unaffected side with knees flexed. Partially extends the extremity under study and places sandbags under knee and foot so that the foot is in the lateral position and the metatarsophalangeal joint is at right angles with the table. Places a packet of occlusal film under the lower metatarsal region and centers. Immobilizes foot. Performer adjusts the x-ray tube so that the central ray will enter the prominence of the first metatarsophalangeal joint at an angle of 40° cephalad.

c. For the foot, performer centers with reference to the appropriate metatarsal bone. Makes sure that patient is rehearsed for complicated procedures, such as with request for pes-planus or pes-cavus films for deformity of the longitudinal arch (for which performer makes weight-bearing composite AP (dorsoplantar) projection involving two exposures without movement of the part or film, and makes lateral weight-bearing axial projection with one exposure of each foot with patient standing on special bench). If request is for foreign body localization or position or alignment of fracture fragments, performer makes AP (dorsoplantar) and lateral projections. For foreign body localization performer determines the point of entry and tapes a small lead marker over the point.

i) For AP (dorsoplantar) projection to obtain posterior (plantodorsal) view, performer has patient seated on chair or table or lying on table in supine position. Has patient flex knee on affected side so that the sole of the foot rests on the table, centered on film holder to the proximal end of the third metatarsal, with long axis of film and foot parallel. As an alternative, performer may hold film holder in contact with the plantar surface of the foot using an angulation block. Performer uses sponges and/or compression bands to immobilize; may place a non-skid mat to keep film holder from slipping on table. Depending on orders, positions tube to enter centered part at right angles to film or at 15° cephalad.

ii) For lateral projection performer places patient in recumbent position, preferably with the medial side of the foot in contact with the film holder (lateromedial projection and mediolateral view). Elevates the knee so that the patella is at right angles with the table and plantar surface of foot is perpendicular to film. Centers film holder to proximal end of fifth metatarsal with long axis of film and foot parallel. If the lateral side of the foot will be in con-

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tact with film, has patient dorsiflex foot enough to accomplish similar positioning. Immobilizes as appropriate.

iii) For composite weight-bearing dorsoplantar (AP) projection (giving an axial view of the foot), performer has patient stand erect on floor or table depending on equipment. Instructs patient not to touch any overhead mechanism and repeats instructions on holding foot being studied in place for two exposures, one with unaffected foot placed one step behind, and, with second exposure, with unaffected foot placed one step before the foot being studied. Places film holder in position centered under the foot. For first exposure places x-ray tube in front of patient with a posterior angulation of 15° centered to the scaphoid. For the second exposure, with foot and film unmoved, places x-ray tube behind patient with an anterior angulation of 25° centered to the posterior surface of the ankle.

iv) For lateral weight-bearing view of longitudinal arch, performer takes film holder which has been masked on lower half and places in film well of special bench or between prepared blocks. Instructs patient not to touch overhead equipment and has patient stand erect on bench or blocks with the unmasked film between feet, and weight equally balanced on both feet. Centers film holder to the base of the fifth metatarsal of the feet. Instructs patient to retain position after first exposure so that film can be removed, reversed, remasked, and reinserted for second view of other foot. Performer adjusts the tube to the foot being radiographed so that it is horizontal and so that the central ray enters the lateral surface at right angles to the film at the centered point.

v) For oblique projection (oblique plantodorsal) performer places the patient in lateral recumbent position on the affected side with knees flexed. Has patient extend the affected leg and rotate foot laterally until the sole forms a 45° angle with the plane of the film. May have patient assume prone position with affected foot elevated on sandbags and dorsal surface resting on film holder. Rotates heel medially or laterally depending on the metatarsal interspaces to be viewed.

For oblique dorsoplantor projection has patient lie in supine position, flex knee of affected side and place sole of foot on table on film holder. Then has patient rotate leg medially or laterally as appropriate. Supports elevated side of foot.

d. For the subtalar joint, performer notes which joint surfaces (anterior, middle and/or posterior articulations) are to be shown.

1) For anterior subtalar articulation, oblique lateral projection, performer has patient take semisupine or seated position and turn away from affected side. Has patient flex knee on affected side, place ankle joint in near right-angle flexion and lean leg and foot medially. Adjusts leg so that long axis is

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in line with long axis of foot. Supports the knee and places foam wedge under each side of the foot and ankle. Adjusts tube so that central ray enters vertically somewhet distal and anterior to the lateral malleolus.

ii) For middle articulation, oblique lateral projection, has patient lie on affected side in lateral recumbent position with unaffected knee comfortably flexed and supported. Has patient extend the affected foot. Centers on film holder so that ball of foot is angled forward about 25°. Elevates heel and immobilizes foot. Directs central ray to ankle joint at eccentric angle of 5° anterior, 23° distal.

iii) For medial oblique axial projection of middle articulation has patient seated on table with weight on unaffected side and hip and thigh flexed or semirecumbent. Has patient rotate leg and foot medially and rest side of foot and ankle against foam wedge. Provides support for knee. Has patient maintain a dorsiflexed position by pulling on a bandage strip that performer loops around ball of the foot.

For lateral oblique axial projection of posterior articulation, performer positions as in (ii), above, or as just described, but with lateral rotation instead of medial. Directs central ray somewhat distal to medial malleolus at 10° cephalad for both lateral or medial oblique view.

iv) If request is for right angle oblique views at different central ray angulations, performer places a film tunnel on table top where the film holder will be placed so that after the foot is positioned (on the tunnel) for a given projection a separate film can be used for each exposure without repositioning foot. Has patient assume a supine position with support under each knee and unaffected ankle. Performer loops a strip of bandage around the ball of the foot and has patient pull this to dorsiflex foot and maintain right-angle flexion at the ankle joint.

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For lateral oblique projections has patient rotate leg and foot 45° laterally in right-angle flexion and provides support. Angles central beam 15° cranially for first exposure with central ray directed somewhat distal and anterior to medial malleolus. For subsequent exposures changes angulation as ordered.

For medial oblique projections rotates as above but in medial direction and centers central ray towards midpoint of imaginary line between the most prominent point of the lateral malleolus and the base of the fifth metatarsal. Adjusts tube 40°, 30°, 20°, and 10° cephalad for the series of projections or as ordered.

e. For the calcaneus (os calcis) (bilateral: calcanei), performer notes whether patient is to be studied bilaterally (both feet on one view) or unilaterally, and whether a weight bearing view is required. If so, instructs patient not to touch any overhead apparatus.

i) For plantodorsal (PA) projection performer has patient assume a

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supine or seated position with both legs fully extended (for bilateral study). Centers film holder under ankles to include both joints. Performer loops a strip of gauze bandage around the balls of the feet and has patient pull so that ankles are at right angle dorsiflexion. If this is not possible, performer elevates extremities to obtain position in which the soles of the feet are at right angles to table top. Angles tube at 40° cephalad to the soles of the feet, entering the plantar surfaces at the base of the fifth metatarsals.

ii) For recumbent dorsoplantar (AP) projection has patient assume prone position with both legs fully extended (for bilateral study). Elevates ankles so that soles are at right angles to table, and places vertical film holder against soles of feet. Centers as above and so that central ray is at 40° with plane of film.

iii) For weight bearing dorsoplantar projection has patient stand on film holder. For unilateral study has patient place opposite foot one step forward. Centers film to long axis of calcaneus with posterior surface of heel(s) at edge of film. Places tube at 45° anterior directed through posterior surface as described above.

iv) For lateral projection has patient lie on affected side with knees flexed. Has patient partially extend affected extremity. Centers calcaneus over center of film and rotates until a true lateral is obtained with long axis of film parallel with plantar surface of heel. Directs central ray at right angles to the film holder at center of part.

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f. For the ankle (tarsus) performer notes whether the projections requested involve stress studies. If so, may have orthopedic surgeon or other physician adjust foot into stress position and hold, strap or indicate to performer that patient can hold position using bandage strip looped around ball of foot.

i) For stressed AP projection(s) (posterior views) performer usually works with patient already positioned (seated) on table with leg extended. If appropriate, loops gauze around ball of foot. Has plantar surface of foot at right angles to film holder. Has patient hold bandage so that foot is inverted as much as possible for inversion study, or everted for eversion study. Supports knee and braces plantar surface. Centers ray at right angles to film through the midportion of the ankle mortise in line with the tip of the medial malleolus.

ii) For oblique views of the ankle performer has patient take supine position. Centers film holder to the ankle joint. Rotates entire leg and thigh to 45° externally for a lateral oblique projection. For medial oblique elevates hip and rotates leg and thigh 45° internally. For "mortise" oblique rotates leg internally until the medial and lateral malleoli are parallel to the film holder. Uses foam wedge and sandbags to support. Uses strip bandage around ball of foot and held by patient to dorsiflex the foot.

iii) For AP projection (posterior view) has patient move extended leg (while seated or supine) into AP position with foot

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slightly inverted but without any rotation of leg. Supports knees and keeps plantar surface at right angles to film holder. May use bandage held by patient looped around ball of foot to support. Centers to joint and directs central ray at right angles to film holder entering midway between malleoli.

iv) For lateral projection performer attempts to position patient so that the medial side of the ankle will be in contact with film holder. With patient supine, has patient turn away from affected side. Has patient turn so that patella is at right angles to table top. Supports knee. If the lateral side will be in contact with film holder has patient lie on affected side in lateral recumbent position, assume similar position and dorsiflex foot. Centers to joint or as ordered so as to include the requested area of the leg and/or calcaneus. Directs central ray at right angles to joint and film holder.

g. If, during positioning, patient shows signs of severe pain, performer may notify appropriate physician at once and await orders or may decide on alternative positioning to avoid movement of the affected part.

13. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size (or the size of the unshielded area of the film to be exposed).

Checks that primary beam will enter the center of the area of interest at right angles to the film (or selected

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angle) so as to project the view desired. For the first view of a series may mark a point on the part that is even with the center of the film holder for use in lining up subsequent views. May readjust tube position lengthwise or crosswise to provide better centering. Uses cross-hair shadows as reference for center of field.

14. Once the patient has been positioned and immobilized performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). If appropriate, performer may attach auxiliary extension cones to collimator to further reduce the primary beam.

15. Performer may add lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that protective shielding has been provided to everyone who will remain in room.

16. Throughout procedure performer observes patient for any signs of emergency and/or to prevent or respond to an accident. Is alert to signs of nausea, dizziness, or sweat suggesting faintness. Performer may have patient lie down, lower head or raise legs. Notifies nurse. If patient shows any other emergency signs, loses consciousness, or has an accident, performer calls appropriate physician or nurse at once. May decide to provide emergency first aid as well.

17. When everything is ready for the exposure, performer explains to patient the need to keep perfectly still when

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indicated by performer and until told to relax. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

18. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to hold still by calling or using intercom. Performer initiates exposure by pressing hand trigger or exposure control button.

    a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
    b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction, may decide to report; anticipates need to repeat exposure.
    c. After exposure is completed tells patient that he or she can relax (unless composite exposure is to be made).
    d. If exposure is terminated by circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

19. Performer returns to patient. Removes film holder from its location (except for composite exposure).

    a. Removes any markers for further use. If multiple views are to be taken on the film, removes leaded rubber mask and remasks all but next area to be exposed. With weight bearing study masks other side and reverses in film holder well.
    b. If the patient is being examined for possible fracture or if so requested, performer arranges to have the

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first exposure processed at once and brought to the appropriate radiologist.

    c. Depending on whether radiologist will evaluate radiographs before completion of all possible exposures for the series, performer arranges to process film(s) and evaluate for quality control personally, have this done, or bring to dark room for processing and later evaluation, based on time available, institutional arrangements or specific instructions. Attaches ID card for use with flasher if appropriate. May sign requisition.
    d. While films are being processed and/or evaluated performer has patient relax in examination room or holding area. Explains what will happen next.
        i) Performer determines whether patient should remain on table and/or in room, whether patient requires observation. If appropriate, arranges to have patient attended while waiting.
        ii) If patient is to leave table or rise, performer makes sure all equipment is moved away from patient such as overhead tube and upright film holder.
        iii) May decide to assist patient to chair or stretcher or from chair or table. Makes sure to remind patient of any footrest when stepping off table.

20. When (or if) performer learns from the radiologist the extent of the injury and/or whether further conventional views and/or positions can be undertaken, eliminated, or altered, performer proceeds as appropriate according to instructions.

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a. For further exposures performer repeats appropriate steps for next view(s) including identification of film holder and use of R-L marker, selection and setting of technique for next view (if different), positioning patient and equipment for focus-object-film alignment, proper collimation and shielding, and making exposure as described above. For multiple exposures on one film, keeps R-L reference point constant; centers using the point marked earlier on the part to line up with center of film. b. Performer refrains from commenting on the films or providing any interpretation. c. If performer is asked to repeat any exposures, makes sure that the additional exposures are warranted medically, since additional radiation will be incurred. i) Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes." ii) If request for retakes reflects malfunctioning equipment performer reports malfunction to appropriate staff member. iii) If request for retakes reflects the preference for density or contrast of a radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided. 21. When performer is sure that the examination has been completed, performer may have patient transported back to holding area or next location or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise.	22. Performer carries out termination steps for the examination: a. Performer has equipment and examination table cleaned after use or decides to do personally, depending on institutional arrangements. b. Performer records the examination according to institutional procedures. May include date, room, examination type, the views taken, the technical factors used and film size; may record the number of exposures made of each view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. If any views called for in the initial request could not be obtained performer may record reasons. Signs requisition sheet. c. Performer may decide to jacket films, requisition sheets, and related materials and/or have information recorded in log book personally or have this done, depending on institutional procedures. d. May indicate to appropriate staff person when the performer is ready to proceed with next examination.

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1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured,positioned;part measured;films identified;technical factors selected and set;technique for magnification and/or multiple views set up;exposures made;radiographs sent for processing and evaluation;procedures repeated as appropriate for full set of views;patient returned; examination recorded;radiographs placed for use.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, technical history;pen;x-ray machine control panel(s),tube,bucky,table,collimator,extension cones; technique chart;charts for conversion of technique, standard examination views,dosage,tube capacity; loaded cassettes or nonscreen film holders;vertical film holder;leaded rubber shielding;R and L and ID markers;immobilization devices;stool;calipers;tape; scissors;stretcher or wheelchair;bandage;elevation box;protractor

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-infant patient to be radiographed; radiologic technologist;radiologist;nurse

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Taking plain film radiographs of leg(s),knee(s) and/or femur(s) of non-infant patient by reviewing request;reporting observed contraindications;reassuring pt.;measuring part;setting up for multiple views and/or magnification technique;selecting and setting technical factors;identifying film;positioning pt. and equipment for seated or recumbent exposure;providing shielding;collimating;making exposures;having radiographs processed and reviewed;repeating for full set of views or as ordered;having pt. returned;placing radiographs for use;recording examination.

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Performer receives or obtains the x-ray requisition form, patient's identification card, and any appropriate medical-technical history for a non-infant patient scheduled for radiography of the leg(s), knee(s) and/or femur(s):

a. After checking assignment on schedule sheet.
b. From co-worker.
c. After having arranged requisitions in order of priority.

The plain films of the knees may serve as preliminary "scout" films for knee arthrography (a contrast study); the plain films of the femur(s) may be part of a bone-survey.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided.

   a. Performer checks the examinations called for including the parts involved, the affected side, whether bilateral or unilateral studies are requested,the patient positions and views called for, the number of exposures,the central beam angulation,the area of interest and joints to be included, the requested angulation of the leg,whether known or suspected fractures are involved, or de-

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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structive disease, and the sites. Notes any request for magnification. Checks the name of the referring physician.

b. Performer reads patient's name, identification number, sex, age, weight. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information that will affect patient positioning, technique, or handling of the patient, such as presence of plaster cast, splints (to be left in place or removed by a staff physician), whether patient will be on a stretcher or wheelchair, and any notation on the nature of any known pathology which would affect technique (such as bone infection), and the purpose of the study.

c. If an axial projection of the patella is ordered, performer checks whether a transverse fracture of the patella has been ruled out or arranges to have this done by planning to take a lateral view of knee and awaiting results. (Does not proceed with positioning for axial projection unless there is no danger of fragment displacement.)

d. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, catheters or similar devices in place; whether patient will be accompanied by nurse or other staff person.

e. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved. Goes to examination room or control room for machine involved.

f. If magnification has been requested, performer checks that the machine to

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be used has a fractional focal spot of appropriate size for direct magnification technique (i.e. 0.3 mm or smaller).

g. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete. Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

h. Depending on institutional procedures performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether patient's radiographic exposure history should be brought to radiologist's attention.

i. Depending on institutional procedures performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus. Notes shielding needed.

j. If patient's record indicates orders for sedation or any other prior medication performer may check timing to be sure a proper elapse of time has occurred for medication to take effect. May arrange to delay examination if appropriate.

k. If referring physician has requested that films already on file be sent with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to

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select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer notifies supervisor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate and proceeds after obtaining needed information, signature or orders.

3. When performer is clear about what will be involved in examination, he or she prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Performer reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).
   b. Performer washes hands as appropriate; depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
   c. Performer makes sure that x-ray equipment is ready for use. Goes to control panel for x-ray generator and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for machine to "warm up." If appropriate, performer may set radiography mode selector and set collimator control for manual operation.
   d. Performer checks that appropriate immobilization devices such as sandbags, wedge sponges, gauze bandage, tape are present and that there is a mattress, pads, pillows and/or blankets for comfort of patient if patient will lie on table. If appropriate, obtains protractor for setting leg angulation, and a prepared cushion or box for high elevation in knee study.

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   e. Checks that there is leaded rubber shielding available in room to be used to mask film, protect the patient, and/or place beneath the film holder, as appropriate.
   f. Performer prepares for identification of the films using equipment provided by institution:
      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
      iii) Checks identification against requisition sheet.
      iv) Performer makes sure that right (R) and left (L) markers are available for use.

4. If magnification has been requested, performer prepares the equipment for the tube-over-table method of magnification (used without bucky):
   a. Performer determines the degree of magnification requested on the requisition sheet; if the request is expressed as an area magnification performer determines the linear magnification by taking the square root. (Linear magnification squared equals area magnification.)
   b. Performer calculates the required distances from target (focal spot) to object (patient) (TOD), and from object to film (OFD), as well as the distance from target to film (TFD) (the sum of TOD and OFD):

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i) If the distance from the table top to a film holder placed on the floor or a stool (OFD) will be a relatively inflexible distance, performer measures this distance or reads indicator scale. (If stool is to be used, may note the table height.) Performer may adjust table height to provide for a round number for the OFD.

ii) If the distance from the focal spot to the table top (TOD) will be the relatively inflexible distance, performer determines what this is by measuring or reading appropriate indicator scale on tube housing. Performer may adjust tube height to provide a round number for the TOD.

iii) Depending on whether the OFD or the TOD is fixed, performer calculates the required complementary distance by referring to a magnification chart for the degree of linear magnification required, or uses the formula: degree of linear magnification equals TFD divided by TOD. For a two-times linear magnification performer simply sets the TOD equal to the OFD.

iv) Performer adjusts and locks the table height and/or the tube height to the calculated OFD and TOD.

c. Performer aligns the object-film and target-object distances:

i) Performer moves the x-ray tube housing until it is centered over the table top in the approximate area where the patient's area of interest will be positioned, such as on table.

ii) Performer swings the table out of the way so that there is no obstruction between the tube and the floor. (Does not change height.)

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If appropriate, places a stool on the floor under the tube. May place lead shielding on floor or on stool. May place film holder of appropriate size on floor or stool. Performer selects the size film designated for the degree of magnification and the selected part to be studied.

iii) Performer adjusts the collimation to correspond to the field size anticipated (for the TOD involved).

iv) Performer activates the light in the collimator and adjusts the tube horizontally so that the light beam cast is centered to the film holder or lead shielding on the stool or floor. Uses the cross-hairs projected by the beam to center the tube to the area on the floor or stool.

v) Performer locks the tube into position so that there is a 90° angle of the beam with the floor or stool. Fixes and retains collimator setting.

vi) Performer marks the outline of the collimated light area or film holder on the floor or stool or on the lead shielding using tape or other removable marker. If not already done, checks by placing film holder in marked area. May mark center of area as shown by cross-hairs.

vii) Performer swings table back into place. Activates light beam in collimator and marks the table top where the center cross-hairs and light outline are projected (to be used to center the part to be radiographed). Uses tape or other radiolucent removable marker.

viii) Performer may recheck TOD and OFD to be sure that they correspond to the calculated distances.

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d. For magnification technique using a vertical film holder, performer may wait until patient has been brought into examination room. Adjusts upright holder to appropriate height; adjusts x-ray tube to right angle projection of beam to film holder; centers to the film; measures and adjusts TOD to patient's position and marks patient's position; measures and adjusts OFD from patient's position as marked.

e. If the sum of the new TOD and OFD (TFD) is now different from the TFD used for non-magnification technique, performer may consult technique chart to note the factor to use for a compensatory change in mAs. May record for later use in setting exposure factors.

f. Performer may also note the change in kVp and mAs necessary to compensate for any change in collimation from non-magnification technique. Consults appropriate charts for conversion factors. May record.

5. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

a. Depending on institutional arrangements performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

b. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

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c. Has patient assume a comfortable position seated on table or chair. If patient is in wheelchair, moves patient in chair into position next to table. If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. Otherwise arranges if necessary to move patient to table or use upright film holder with patient remaining on stretcher.

d. Performer explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

e. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains when asked medical questions that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

f. If patient has an IV drip in place, performer checks that needle has not become dislodged and that the fluid is dripping at an even rate. If there are any problems, performer clamps tube and notifies an appropriate staff person at once.

g. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs appropriate physician and proceeds only with approval.

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6. Performer questions patient and/or RN or MD present on what movement is possible in the affected extremity and on the opposite side; may question patient about any injury or pain to determine what mobility is possible and what positions are available for use.

   a. Performer evaluates whether patient should be seated on x-ray table or should be recumbent on table. Evaluates whether patient can tolerate having the affected part placed flat on film holder or requires alternative positioning with use of an angulation block.
   b. For knee, performer determines whether the knee can be fully extended; if not, performer may decide to elevate a cassette on sandbags; may decide to use a curved cassette, or may use a flexible film holder.
   c. For the femora performer notes whether the size of the patient or the presence of abnormal bowing of the femora requires that the projections be made in two separate exposures for each view (one film for the upper portion of the femora and a smaller film for the lower portions and knee joint).
   d. Determines whether conventional flexion can be utilized in the joints involved, and whether film holders can be placed in conventional positions or need to be used in upright holders or supported by angle wedges. If movement is limited or fracture is suspected, performer decides on alternative x-ray tube and patient positions to use to accomplish the equivalent radiography with a minimum of movement by the patient.
   e. Performer considers the number and types of projections ordered for the examination and the patient's condition. Performer may consider a change from standard projections to better accomplish the purpose of the examination, or deletion of a position or a change in technical factors. Depending on institutional arrangements, performer may obtain permission from appropriate radiologist or decides personally to alter the standard procedure.
   f. Depending on whether a bucky or table top technique will be used and standard institutional practices, performer selects speed and type of film for nonscreen film holder or cassette combination.
      i) Selects size(s) based on the area(s) to be included, the patient's size, whether single exposure bilateral views are involved, and the number of views to be exposed on a single film.
      ii) For the legs and femora performer may check that cassette is long enough to extend from one to two inches beyond the distal and proximal joints. If the femora or leg(s) are too long for this and the site of the lesion is not known, performer selects and plans for two exposures for each view, one film to include the proximal joint and one smaller film to include the distal joint. If the site of the lesion has been localized, performer selects cassette to include the joint nearest the site.
      iii) For magnification technique performer selects the size film designated for the degree of magnification and the selected part to be studied.
      iv) Performer makes sure that an adequate supply of loaded cassettes or film holders of the types and sizes selected are available in

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the examination room. If not, arranges to obtain or decides to obtain personally.

7. Performer prepares for the examination:
   - a. Performer obtains the appropriate size loaded non-screen film holder or cassette for the first projection.
   - b. If several views will be taken on one film, performer mentally decides how these will be positioned so that the film need not be turned for viewing each image. Performer uses leaded rubber sheets and masks the film holder completely except for the area to be exposed. Treats the area to be exposed from this point as though it were the actual film size.
   - c. Performer attaches identification information to the film holder or table top:
     - i) Places right or left marker on film holder or table-top as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.
     - ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of film holder.
     - iii) If patient's identification information is to be entered by use of flasher, sets flashcard aside for later use with space created by piece of leaded rubber on appropriate edge of holder.
     - iv) Performer may place patient's card into card tray for equipment using automatic film marking device.
   - d. If cassette is to be used with bucky (under tabletop or in upright holder) performer may manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and

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pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.
   - e. If a bucky is not being used, performer places nonscreen film holder in a position that can be comfortably reached by the patient in final positioning. May place leaded rubber sheet under film holder.
     - i) If magnification technique is to be used, performer places film holder in marked position on floor or stool.
     - ii) If appropriate to make possible minimal movement of patient, performer may place film in upright holder at right angles to table top or in other position selected.
   - f. If not already done, has patient remove shoes, hose and any garments covering either leg. May assist patient or request assistance from nurse if there is a fracture involved.
   - g. If there is a splint or cast on an injured area, performer has RN or MD carry out any orders on removal. If there is a wet dressing, performer has it reinforced or decides to do personally.
   - h. Performer provides patient and everyone who will remain in room during exposure with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

8. Performer has patient assume a comfortable recumbent or seated position depending on the positions to be employed, so that the part(s) to be radiographed can be measured in position.

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- a. If appropriate, places mattress, pillow or clean linen on x-ray table.
- b. Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way and may be collided with by patient.
- c. If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.
- d. Performer uses centimeter calipers to measure the thickness of the part(s) to be radiographed in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors.
- e. After measuring, has patient rest in as relaxed a position as possible. May place pad, blanket or pillow under bony prominances to provide comfort.

9. Performer selects the exposure factors for the first projection by consulting the technique chart(s) posted for the machine:

- a. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other accessories (such as screens, bucky, etc.).
- b. Makes note of the kVp, mA, T(seconds of exposure time), focal spot size, and the focal film distance (TFD or FFD) called for.
- c. Once the standard kVp, mA and time has been determined, performer notes whether any conversions are necessary to account for a pathological condition, a cast, change in TFD, preference of the radiologist involved, and any other conversion needed such as with magnification technique. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate.
- d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

10. Performer sets exposure factors as selected:

- a. Enters control room. Makes sure that indicator light shows that x-ray generator is ready for use. Makes sure that all circuits have been stabilized.
- b. If appropriate checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.
- c. For conventional exposure control:
    - i) Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.
    - ii) Performer selects and sets the exposure time that will produce the mAs desired.
    - iii) Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

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d. For automatic phototimed exposure control:
   - i) Performer selects and sets the category corresponding to the type of study and use or non-use of screens, bucky,etc., and, if appropriate, focal spot size.
   - ii) Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).
   - iii) May select and set a kVp range button, if called for with equipment, corresponding to range for examination.
   - iv) Sets a density selector corresponding to the usual (or special) requirements for the study.
   - v) Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.

e. Depending on the equipment, may set controls to provide for use of bucky,manual tableside adjustment of table and tube height, position, and of collimation (unless these have already been set as with magnification technique).

f. Performer returns to overhead unit and sets the focal-film distance (if not already done, as with magnification technique). Operates controls or manually moves the x-ray tube into place over the film holder (or at right angles to upright holder). Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD is obtained.

11. Performer places the part to be radiographed in the final position selected for the first exposure. Makes sure that correct leg, knee or femur is being positioned (with unilateral study).With young patients may plan to radiograph both affected and unaffected sides for comparison if so ordered.

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Performer centers part and keeps the long axis of the part parallel to the film holder. May explain or demonstrate to patient what is required. May obtain help in positioning. Performer may position as follows (unless nonconventional positioning is being used to avoid having patient move):

a. For the leg(s), performer positions for bilateral views so that both legs will be projected with one exposure. Where two exposures are necessary to include the full length of the leg and both joints performer positions the patient with cassette centered under upper area;removes cassette after exposure and centers smaller cassette under lower area with as little movement of patient as possible. Otherwise centers to include the joint nearest the site of the lesion. Directs central ray at appropriate angle to film holder.
   - i) For oblique projections performer has the patient assume a supine position. For the lateral oblique projection performer rests the lateral side of the foot on the affected side against a 45° foam wedge. For the medial oblique projection performer abducts the leg somewhat or has the patient shift the pelvis away from the affected extremity. Elevates the hip so that the medial side of the foot and ankle rest against a 45° foam wedge. Supports as appropriate.
   - ii) For an AP projection (posterior view),performer retains patient in supine position but adjusts body so that there is no rota-

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tion at pelvis. Has patient extend the affected leg(s). With leg(s) in AP position performer inverts the foot (feet) slightly without rotating leg(s). Supports sole(s) with sandbags.

iii) For lateral projection, performer moves the patient from the supine position to a lateral recumbent on the affected side with the unaffected knee flexed. May have patient turn away from affected side, cross affected leg over and on to cassette. Adjusts the patient's body so that the patella is at right angles to the film holder. Supports with sandbags.

b. For the knee, performer helps patient to assume a prone or supine position as decided. Uses regular cassette, curved cassette, or flexible nonscreen film holder as decided. If performer is to take scout films preliminary to arthrography, performer makes AP or PA, lateral projections, and "tunnel" views of knee or as ordered. If patellar fracture may be involved, makes sure not to flex the knees more than 10°.

i) For AP projection (posterior view), performer has patient assume a supine or seated position on table with no rotation of the pelvis. Supports the ankle of the affected side. Places film holder under the knee. Has patient extend legs with unaffected leg flexed somewhat for comfort. Centers to the apex of the patella and rotates leg so that a line through both femoral epicondyles is parallel with the plane of the film. Directs the central ray as appropriate to purpose of study (at right angles to film for bones of joint and

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5° to 7° cephalad for joint spaces).

ii) For PA projection (anterior view), performer has patient lie in the prone position with legs extended and ankles and feet supported. Adjusts positioning by rotating leg. Immobilizes with sandbags. Centers ray to the popliteal depression.

iii) For lateral projection, performer notes whether the knee is to be in right-angle flexion. If so, has patient lie on affected side, bring the affected knee forward, and extend the other leg behind it. If the knee is to be in partial flexion or extension has patient bring the unaffected knee forward and supports it. Uses sandbags to prevent forward rotation of the pelvis. If there is any patellar fracture performer makes sure that there is no flexion beyond 10° or what is needed to relax the muscles. After the knee is flexed to the desired angle, performer centers the film to the joint. Adjusts supports so that long axis of leg is horizontal and patella is at right angles to film. Directs central ray 5° cephalad. (Performer awaits results of this view before doing axial views of patella if there is suspected fracture.)

iv) For PA oblique projections, performer has patient take prone position with ankles supported. Elevates the hip of affected side and rotates the leg 45° medially for posteromedial oblique projection; elevates opposite hip and rotates 45° laterally for posterolateral oblique projection. Centers cassette under knee parallel to its long axis.

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Supports elevated hip. Directs the central ray at right angles to the film.

v) For AP oblique projections, performer positions as above, but with patient in supine position with ankles supported. If necessary, places sandbag under film holder to minimize part-film distance.

vi) For the semiaxial PA projection of the intercondyloid fossa, has patient take prone position with no rotation in body, and supports the ankle and foot of the unaffected side. Performer places a specially prepared cushion or box high enough to support the leg with the knee flexed at a 40° or 50° angle as ordered, and adjusts until the angle is achieved. May use protractor as guide for obtaining angulation. Centers the proximal half of the cassette to the knee joint. Adjusts foot to eliminate any rotation of knee. Adjusts the tube so that central ray will enter at right angles to the long axis of the leg, centered to the popliteal depression.

vii) For a semiaxial PA projection "tunnel view," performer has patient kneel on table or on a bench at the end of the table resting against tabletop. Has the feet extend over the end so that the long axis of the legs are parallel with the surface being kneeled on. Centers film holder under one or both knees with reference to the apex of the patella. Adjusts patient's body to lean so that the long axes of the femur and tibia are in the same plane, and the shaft of the femur is at 70° to the table. Directs central ray at right angles to film.

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viii) For semiaxial AP projection "tunnel view,"has patient lie in supine position with no rotation in body. Adjusts the elevation of the leg and flexion of the knee so that leg and femur form a 120° angle. Supports knee. Adjusts leg in AP position. Places curved cassette or flexible film holder beneath the posterior surface of the knee centered so that central ray will enter the "notch" at a right angle to the long axis of the tibia at the center of the cassette or holder. Immobilizes foot.

c. For the kneecap (patella),performer notes whether the knee is painful and, for prone position, places sandbags to relieve pressure on the patella.

i) For PA projection (anterior view) has patient lie in prone position with leg extended and cassette parallel to the long axis of the knee and centered to patella. Rotates heel outward so that patella is parallel with plane of film. Directs central ray at right angles to film.

ii) For oblique PA (superoinferior) projection,has patient remain prone. Elevates and supports hip on affected side and supports ankle and knee. Allows about 10° flexion of knee. Centers film to patella. Turns knee slightly away from PA position, presses index finger lateralward against medial border of patella, and rests knee on its anteromedial side with patella in lateral displacement. Immobilizes. Directs the central ray to joint space between patella and femoral condyles at 25° to 30° caudad.

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iii) For axial view of the patella (unilateral or bilateral), performer has patient lie in supine or prone position after transverse fracture of patella has been ruled out. For prone position has patient flex the knee slowly and evenly (to avoid undue pain) until patella is at right angles to the film. Performer loops a long strip of bandage around ankle or foot and has patient grasp the ends over his or her shoulder to maintain position. Adjusts leg so that there is no sideways leaning. Centers cassette under patella. For bilateral view performer has patient hold knees in contact with each other; adjusts similarly, with two strips of bandage used, one over each of patient's shoulders and flexed to the limits set by the injured knee. For patients unable to assume prone position performer assists with supine, lateral or seated position. Has patient flex knee(s) so that leg and thigh are at right angles with feet resting on table top or supported. Places film holder on the anterior distal thigh(s) with patella(s) at center. Has patient hold film holder or tapes into position. May use 45° positioning block. Performer directs the central ray to pass along the long axis of the patella between the patella and the femoral condyles.

d. For the femur(s), performer positions for unilateral or bilateral study. If both joints are to be demonstrated and cassette is not long enough, performer may maintain patient's position for two exposures for each view, one of the distal femur(s) and the other of the proximal femur(s). Where there is a possible fracture or destructive disease, performer uses supine position to obtain lateral views. If films are for bone survey, performer takes AP projection of femura or as ordered.

   i) For AP projection (posterior view), has patient assume supine position with legs fully extended and feet somewhat inverted but with pelvis unrotated. Immobilizes with sandgags. Centers to include the area of interest and the joint nearer to the injured site unless both joints are requested or the injury site is unknown. If using two cassettes centers as appropriate to the part of the view to be exposed. Directs central ray at right angles to film.

   ii) For lateral projection, with patient supine, performer uses upright holder and places cassette vertically along the medial or lateral aspect of thigh and knee. For lateral projection where bone fracture or destructive disease is not involved, has patient lie on the affected side, flex affected knee, and draw it backward to include hip joint or forward to include knee joint. Centers long axis of femur over the center line of table. Uses sandbags to support. Rotates hips to avoid superimposition. Centers cassette in bucky tray and directs central ray at right angles to center of film.

e. If, during positioning, patient shows signs of severe pain, performer may notify appropriate physician at once and await orders or may decide on alternative position-

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ing to avoid movement of the affected part.

12. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size (or the size of the unshielded area of the film to be exposed).

    Checks that primary beam will enter the center of the area of interest at right angles to the film (or selected angle) so as to project the view desired. For the first view of a series may mark a point on the part that is even with the center of the film holder for use in lining up subsequent views. May readjust tube position lengthwise or crosswise to provide better centering. Uses cross-hair shadows as reference for center of field.

13. Once the patient has been positioned and immobilized performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). If appropriate, performer attaches auxiliary extension cones to collimator to further reduce the primary beam.

14. Performer may add lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that protective shielding has been provided to patient and everyone who will remain in room

15. Throughout procedure performer observes patient for any signs of emergency and/or to prevent or respond to an accident. Is alert to signs of nausea, dizziness, or sweat suggesting faintness. Performer may have patient lie down, lower head or raise legs. Notifies nurse. If patient shows any other emergency signs, loses consciousness, or has an accident, performer calls appropriate physician or nurse at once. May decide to provide emergency first aid as well.

16. When everything is ready for the exposure, performer explains to patient the need to keep perfectly still when indicated by performer until told to relax and, for femora, to breath out when told and hold until told to relax. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

17. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to hold still (or breath out and hold still) by calling or using intercom. Performer initiates exposure by pressing hand trigger or exposure control button.

    a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
    b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.
    c. With phototimer notes whether backup timer has been involved in terminating exposure before phototimer exposure was completed. If so, anticipates possible need to repeat exposure (due to underexposure if

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premature cut-off, or overexposure due to faulty timer).

- d. After exposure is completed tells patient that he or she can relax.
- e. If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

18. Performer returns to patient. Removes cassette or film holder from table, floor or bucky.

- a. Removes any markers for further use. If multiple views are to be taken on the film, removes leaded rubber mask and remasks all but next area to be exposed.
- b. If the patient is being examined for possible fracture or if so requested, performer arranges to have the first exposure processed at once and brought to the appropriate radiologist.
- c. Depending on whether radiologist will evaluate radiographs before completion of all possible exposures for the series, performer arranges to process film(s) and evaluate for quality control personally, have this done, or bring to dark room for processing and later evaluation, based on time available, institutional arrangements, or specific instructions. Attaches ID card for use with flasher if appropriate. May sign requisition.
- d. If the first radiograph(s) are preliminary (scout) films, performer brings the processed radiograph(s) directly to the radiologist in charge or places on view boxes and informs radiologist that the scout(s) are ready. If the radiologist indicates that there is any problem with the technical factors or the patient positioning performer records or notes for later use in the examination and/or repeats preliminary radiography as ordered.
- e. While films are being processed and/or evaluated performer has patient relax in examination room or holding area. Explains what will happen next.
  - i) Performer determines whether patient should remain on table and/or in room until physician arrives, and whether patient requires observation. If appropriate, arranges to have patient attended while waiting.
  - ii) If patient is to leave table or rise, performer makes sure all equipment is moved away from patient such as overhead tube and upright film holder.
  - iii) May decide to assist patient to chair or stretcher or from chair or table. Makes sure to remind patient of any footrest when stepping off table.

19. When (or if) performer learns from the radiologist the extent of the injury and/or whether further conventional views and/or positions can be undertaken, eliminated, or altered, performer proceeds as appropriate according to instructions.

- a. For further exposures performer repeats appropriate steps for next view(s) including identification of film holder and use of R-L marker, selection and setting of technique for next view (if different), positioning patient and equipment for focus-object-film alignment, proper collimation and shielding, and making exposure, as described above. For multiple exposures on one film, keeps R-L reference point constant; centers using the point marked ear-

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lier on the part to line up with center of film.

b. Performer refrains from commenting on the films or providing any interpretation.

c. If performer is asked to repeat any exposures, makes sure that the additional exposures are warranted medically, since additional radiation will be incurred.
   - i) Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."
   - ii) If request for retakes reflects malfunctioning equipment performer reports malfunction to appropriate staff member.
   - iii) If request for retakes reflects the preference for density or contrast of a radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.

20. When performer is sure that the examination has been completed, performer may have patient transported back to holding area or next location or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise.

21. Performer carries out termination steps for the examination:

a. Performer has equipment and examination table cleaned after use or decides to do personally, depending on institutional arrangements.

b. Performer records the examination according to institutional procedures. May include date, room, examination type, the views taken, the technical factors used and film size; may record the number

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of exposures made of each view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. If any views called for in the initial request could not be obtained performer may record reasons. Signs requisition sheet.

c. If performer will only carry out preliminary "scout" filming and another technologist will continue with examination, performer records the approved technical factors used for the scouts, and the accessories employed, or informs technologist who will continue. Performer gives the requisition sheet, name card, and any notes to technologist who will continue with procedure.

d. Performer may decide to jacket films, requisition sheets, and related materials and/or have information recorded in log book personally or have this done, depending on institutional procedures.

e. May indicate to appropriate staff person when the performer is ready to proceed with next examination.

TASK DESCRIPTION SHEET

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1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured,positioned;parts measured;films identified;technical factors selected and set;technique for magnification set up;exposures made;radiographs sent for processing and evaluation; procedures repeated as appropriate for full set of views; patient returned;examination recorded;radiographs placed for use.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, technical history;pen;x-ray machine control panel(s),tube,bucky,table,collimator,extension cones; technique chart;charts for conversion of technique, standard examination views,dosage,tube capacity; loaded cassettes;vertical film holder;leaded rubber shielding;R and L and ID markers;immobilization devices;stool;calipers;tape;scissors;protractor;compression band;stretcher or wheelchair

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(x) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-infant patient to be radiographed;radiologic technologist;radiologist;nurse

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Taking plain film radiographs of pelvis,hips and/or upper femora of non-infant patient by reviewing request;reporting observed contraindications;reassuring pt.;measuring part;setting up for magnification technique;selecting and setting technical factors; identifying film;positioning pt. and equipment for erect or recumbent exposure;providing shielding; collimating;making exposures;having radiographs processed and reviewed;repeating for full set of views or as ordered;having pt. returned;placing radiographs for use;recording examination.

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Performer receives or obtains the x-ray requisition form, patient's identification card,and any appropriate medical-technical history for a non-infant patient scheduled for radiography of the pelvis, hip(s) and/or upper femora:

a. After checking assignment on schedule sheet.
b. From co-worker.
c. After having arranged requisitions in order of priority.

The plain films of the pelvis may be part of a bone-survey.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided.

    a. Performer checks the examinations called for including the parts involved, the affected side, whether bilateral or unilateral studies are requested, the patient positions and views called for, the number of exposures, the central beam angulation,the areas of interest and parts to be included, whether known or suspected unhealed fractures are involved or destructive disease,and the sites. Notes whether the use of a grid or bucky will be involved. Notes

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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any request for magnification. Checks the name of the referring physician.

b. Performer reads patient's name, identification number, sex, age, weight. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information that will affect patient positioning, technique, or handling of the patient, such as presence of unhealed fracture, suspected fracture, presence of plaster cast, splints (to be left in place or removed by a staff physician), extremities of unequal length, whether patient will be on a stretcher or wheelchair, and any notation on the nature of any known pathology which would affect technique (such as bone infection), and the purpose of the study. Notes whether requisition includes need to calculate the shaft-neck angle of the femur.

c. With patients with unhealed fractures performer makes sure that a surgeon or radiologist is available to position the patient. If lateral body positions are requested performer makes sure that there is no danger of fragment displacement, injury, presence of unhealed fracture or destructive disease. May check with MD.

d. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter or similar device in place; notes whether patient will be accompanied by nurse or other staff person.

e. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved. Goes to examination room or control room for machine involved.

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f. If magnification has been requested, performer checks that the machine to be used has a fractional focal spot of appropriate size for direct magnification technique (i.e. 0.3 mm or smaller).

g. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete. Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

h. Depending on institutional procedures performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether number of radiographic exposures ordered or done in past should be brought to radiologist's attention.

i. Depending on institutional procedures performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus. Notes shielding needed.

j. If patient's record indicates orders for sedation or any other prior medication performer may check timing to be sure a proper elapse of time has occurred for medication to take effect. May arrange to delay examination if appropriate.

k. If referring physician has requested that films already on file be sent with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

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2. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer notifies supervisor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate and proceeds after obtaining needed information, signature, or orders.

3. When performer is clear about what will be involved in examination, he or she prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Performer reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).
   b. Performer washes hands as appropriate; depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
   c. Performer makes sure that x-ray equipment is ready for use. Goes to control panel for x-ray generator and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for machine to "warm up." If appropriate, performer may set radiography mode selector and set collimator control for manual operation.
   d. Performer checks that appropriate immobilization devices such as sandbags, wedge sponges, compression

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band, tape are present and that there is a mattress, pads, pillows and/or blankets for comfort of patient if patient will lie on table. If appropriate, obtains protractor.
   e. Checks that there is leaded rubber shielding available in room to be used to mask film, protect the patient, and/or to place beneath the film holder, as appropriate.
   f. Performer prepares for identification of the films using equipment provided by institution:
      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
      iii) Checks identification against requisition sheet.
      iv) Performer makes sure that right (R) and left (L) markers are available for use.

4. If magnification has been requested, performer prepares the equipment for the tube-over-table method of magnification (used without bucky):

   a. Performer determines the degree of magnification requested on the requisition sheet; if request is expressed as an area magnification performer determines the linear magnification by taking the square root. (Linear magnification squared equals area magnification.)
   b. Performer calculates the required distances from target (focal spot)

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to object (patient) (TOD), and from object to film (OFD), as well as the distance from target to film (TFD) (the sum of TOD and OFD):

i) If the distance from the table top to a cassette placed on the floor or a stool (OFD) will be a relatively inflexible distance, performer measures this distance or reads indicator scale. (If stool is to be used, may note the table height.) Performer may adjust table height to provide for a round number for the OFD.

ii) If the distance from the focal spot to the table top (TOD) will be the relatively inflexible distance, performer determines what this is by measuring or reading appropriate indicator scale on tube housing. Performer may adjust tube height to provide a round number for the TOD.

iii) Depending on whether the OFD or the TOD is fixed, performer calculates the required complementary distance by referring to a magnification chart for the degree of linear magnification required, or uses the formula: degree of linear magnification equals TFD divided by TOD. For a two-times linear magnification performer simply sets the TOD equal to the OFD.

iv) Performer adjusts and locks the table height and/or the tube height to the calculated OFD and TOD.

c. Performer aligns the object-film and target-object distances:

i) Performer moves the x-ray tube housing until it is centered over the table top in the approximate area where the patient's area of interest will be positioned, such as on table.

ii) Performer swings the table out of the way so that there is no obstruction between the tube and the floor. (Does not change height.) If appropriate, places a stool on the floor under the tube. May place cassette of appropriate size on floor or stool. Performer selects the size film designated for the degree of magnification and the selected part to be studied.

iii) Performer adjusts the collimation to correspond to the field size anticipated (for the TOD involved).

iv) Performer activates the light in the collimator and adjusts the tube horizontally so that the light beam cast is centered to the cassette on the stool or floor. Uses the cross-hairs projected by the beam to center the tube to the area on the floor or stool.

v) Performer locks the tube into position so that there is a 90° angle of the beam with the floor or stool. Fixes and retains collimator setting.

vi) Performer marks the outline of the collimated light area or cassette on the floor or stool using tape or other removable marker. If not already done, checks by placing cassette in marked area. May mark center of area as shown by cross-hairs.

vii) Performer swings table back into place. Activates light beam in collimator and marks the table top where the center cross-hairs and light outline are projected (to be used to center the part to be radiographed). Uses tape or other radiolucent removable marker.

viii) Performer may recheck TOD and OFD to be sure that they correspond to the calculated distances.

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d. For magnification technique using a vertical film holder, performer may wait until patient has been brought into examination room. Adjusts upright holder to appropriate height; adjusts x-ray tube to right angle projection of beam to film holder; centers to the film; measures and adjusts TOD to patient's position and marks patient's position; measures and adjusts OFD from patient's position as marked.

e. If the sum of the new TOD and OFD (TFD) is now different from the TFD used for non-magnification technique, performer may consult technique chart to note the factor to use for a compensatory change in mAs. May record for later use in setting exposure factors.

f. Performer may also note the change in kVp and mAs necessary to compensate for any change in collimation from non-magnification technique. Consults appropriate charts for conversion factors. May record.

5. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

   a. Depending on institutional arrangements performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

   b. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any

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special precautions necessary during procedure.

   c. Has patient assume a comfortable position seated on table or chair. If patient is in wheelchair, moves patient in chair into position next to table. If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move patient to table. With accident patient uses upright film holder with patient remaining on stretcher until injury has been localized.

   d. Performer explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

   e. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains when asked medical questions that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

   f. If patient has an IV drip in place, performer checks that needle has not become dislodged and that the fluid is dripping at an even rate. If there are any problems, performer clamps tube and notifies an appropriate staff member at once.

   g. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer

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informs appropriate physician and proceeds only with approval. 6. Performer questions patient and/or RN or MD present on what movement is possible in the affected femur and hip joint and on the opposite side; may question patient about any injury or pain to determine what mobility is possible and what positions are available for use. Considers whether to have patient recumbent, standing and/or placed in axial or lateral body positions. a. Performer notes the patient's body type, whether the area of interest is heavily covered by muscle or soft fat, whether the palpation points will be easy to find. Notes whether the legs or femora are of unequal length. b. Determines whether conventional positioning can be utilized and whether film holders can be placed in conventional positions or need to be used in upright holders or supported by angle wedges. If movement is limited or fracture is suspected, performer decides on alternative x-ray tube and patient positions to use to accomplish the equivalent radiography with a minimum of movement by the patient. c. Performer considers the number and types of projections ordered for the examination and the patient's condition. Performer may consider a change from standard projections to better accomplish the purpose of the examination, or deletion of a position or a change in technical factors. Depending on institutional arrangements, performer may obtain permission from appropriate radiologist or decides personally to alter the standard procedure. d. Depending on whether a bucky or table top technique will be used and stan-	dard institutional practices, performer selects speed and type of film, grid and cassette combination. i) Selects size(s) based on the area(s) to be included, the patient's size, and whether bilateral views are to be exposed on a single film. ii) For superoinferior projection of femoral neck, performer selects a curved cassette. For calculation of the shaft-neck angle of the femur, performer selects a film large enough to include at least six inches of the femoral shaft. iii) For magnification technique performer selects the size film designated for the degree of magnification and the selected part to be studied. iv) Performer makes sure that an adequate supply of loaded cassettes of the types and sizes selected are available in the examination room. If not, arranges to obtain or decides to obtain personally. 7. Performer prepares for the examination: a. Performer obtains the appropriate size loaded cassette for the first projection. b. If bilateral exposures will be taken on one film, performer mentally decides how these will be positioned so that the film need not be turned for viewing each image. Performer uses leaded rubber sheets and masks the cassette completely except for the area to be exposed. Treats the area to be exposed from this point as though it were the actual film size. c. Performer attaches identification information tc the cassette or table top:

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  i) Places right or left marker on film holder or table-top as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.
  ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of cassette.
  iii) If patient identification information is to be entered by use of flasher, sets flashcard aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.
  iv) Performer may place patient's card into card tray for equipment using automatic film marking device.

d. If cassette is to be used with bucky (under tabletop or in upright holder) performer may manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.

e. If a bucky is not being used, performer places cassette in a position that can be comfortably reached by the patient in final positioning.
  i) If magnification technique is to be used, performer places cassette in marked position on floor or stool.
  ii) If appropriate to make possible minimal movement of patient, performer may place cassette in upright holder at right angles to table top or in other position selected.
  iii) With accident patient, after localization has been established, performer may obtain assistance in lifting any part under which a cassette must be placed while the injured extremity is supported.

f. If not already done, has patient's clothing removed from extremities and provides gown or drape. May assist patient or request assistance from nurse if there is a fracture involved. Keeps torso covered until ready for positioning and radiography; reveals only as much of body as necessary. Treats young patient with as much courtesy as adult.

g. If there is a splint or cast on an injured area, performer has RN or MD carry out any orders on removal. If there is a wet dressing, performer has it reinforced or decides to do personally.

h. Performer provides patient and everyone who will remain in room during exposure with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

8. Performer has patient assume a comfortable recumbent or seated position depending on the positions to be employed, so that the part(s) to be radiographed can be measured in position.

  a. If appropriate, places mattress, pillow or clean linen on x-ray table.
  b. Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain halp. Makes sure that no equipment is in the way and may be collided with by patient.
  c. If assisting patient to step on footstool in order to get on table, helps patient turn into position,

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step backwards on stool, and then sit and/or lie on table.

d. Performer uses centimeter calipers to measure the thickness of the part(s) to be radiographed in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors.
   i) With fractures or accident patient has surgeon or radiologist position the patient.
   ii) In locating iliac crest, performer is careful not to center too high by making sure not to confuse the iliac crest with the heavy muscles immediately above the crest. May have patient inhale deeply and breathe out; then palpates the point of the crest while the muscles are relaxed.
   iii) If performer believes that patient will be embarrassed by palpation of the symphysis pubis, uses the most prominent point of the greater trochanter to locate the same transverse plane.
   iv) If patient has a urinary catheter in place, performer turns patient toward the catheter and tubing to prevent separating it from drainage bottle and breaking sterile system and to avoid causing pain.

e. After measuring, has patient rest in as relaxed a position as possible. May place pad, blanket or pillow under bony prominences to provide comfort.

9. Performer selects the exposure factors for the first projection by consulting the technique chart(s) posted for the machine:

   a. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other accessories that are possible(such as screens, grids, bucky,etc.).
   b. Makes note of the kVp,mA,T(seconds of exposure time),focal spot size, and the focal film distance (TFD or FFD) called for.
   c. Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for a pathological condition, a cast, change in TFD, extreme fat or muscularity, preference of the radiologist involved, and any other conversion needed such as with magnification technique. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate.
   d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

10. Performer sets exposure factors as selected:

   a. Enters control room. Makes sure that indicator light shows that

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x-ray generator is ready for use. Makes sure that all circuits have been stabilized.

b. If appropriate checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.

c. For conventional exposure control:
   - i) Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.
   - ii) Performer selects and sets the exposure time that will produce the mAs desired.
   - iii) Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

d. For automatic phototimed exposure control:
   - i) Performer selects and sets the category corresponding to the type of study and use or non-use of screens, bucky, etc., and, if appropriate, focal spot size.
   - ii) Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).
   - iii) May select and set a kVp range button (if called for with equipment) corresponding to range for examination.
   - iv) Sets a density selector corresponding to the usual (or special) requirements for the study.
   - v) Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.

e. Depending on the equipment, may set controls to provide for use of bucky, manual tableside adjustment of table and tube height, position, and of collimation (unless these have already been set as with magnification technique).

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f. Performer returns to overhead unit and sets the focal-film distance (if not already done, as with magnification technique). Operates controls or manually moves the x-ray tube into place over the film holder (or at right angles to upright holder). Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.

11. Performer places the part to be radiographed in the final position selected for the first exposure (unless this is done by physician). Makes sure that correct side is being positioned (with unilateral study).

a. With young patients may plan to radiograph both affected and unaffected sides for comparison.

b. May explain or demonstrate to patient what is required. May obtain help in positioning or has MD position in accident and fracture cases.

c. Performer centers part and keeps the long axis of the part parallel to the film holder. When using a bucky centers patient to midline. With cassette on table top,centers film to part. With upright holder adjusts height of holder to part and centers part to film.

d. When positioning a patient with a balloon catheter in place performer makes sure that the clamp is not lying over a part to be exposed or that patient is not lying on the clamp.

e. When the patient's extremities are of unequal length, performer notes whether the legs or the femora are unequal. Makes adjustment in positioning at the

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joint above the unequal part, such as placing pelvis so that greater trochanters are in the same transverse plane for unequal femora, and knees at same transverse plane for unequal legs. In immobilizing is careful to position and support feet to avoid rotation of the upper ends of the femora.

12. Performer positions as follows (unless nonconventional positioning is being used to avoid having patient move):

    a. For the pelvis and upper femora performer makes AP projection for bone survey or as ordered.

        i) For AP projection (posterior view) of the pelvic girdle and upper femora, performer has patient assume supine position. Aligns the median sagittal plane of the body to the midline of the table with both legs extended and knees supported. Adjusts shoulders to lie in the same transverse plane. Places sandbags under ankle joints and adjusts to same transverse plane. For extremities of unequal length adjusts as described above. Inverts feet so that long axes of femora are parallel with plane of film by grasping heels and turning feet medially. Performer may check that there is no rotation of pelvis by measuring the distance from the anterior superior iliac spine to tabletop on each side. Overcomes rotation of pelvis due to swelling or atrophy by elevating appropriate side. Immobilizes. May apply compression band. Centers at the level of the soft tissue depression above the greater trochanter. Directs central ray to midpoint and at right angles to film. With congenital hip dislocation may center to symphysis pubis with central ray at right angles and second exposure at 45° cephalad.

        For semiaxial AP projection of male anterior pelvic bones, directs central ray 20° to 35° cephalad, centered to a point two inches distal to upper border of the symphysis pubis; for female, uses angle of 30° to 45° cephalad.

        ii) For lateral projection of the pelvis and upper femora, performer selects lateral recumbent or erect, standing position. For recumbent position, performer may use cross-table projection with AP position or has patient lie on side with thighs fully extended and midaxillary plane of body at midline of table. May have patient grasp side of table for support. Supports lower thorax so that vertebral column is in a horizontal plane. Supports extremities at hip level, and knee and ankle of affected leg, and adjusts long axes to lie parallel with table. Adjusts pelvis so that anterior superior iliac spines are in same vertical plane. Has erect patient stand straight, with weight equally distributed on both feet in lateral position before vertical holder. Adjusts body for median sagittal plane alignment. Supports limb of unequal length. Centers to the level of soft tissue depression above greater trochanter, and directs central ray at right angles to film.

        iii) For semiaxial projection of the pelvis, performer has patient sit on side or end of table so that

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posterior surface of each knee is in contact with edge of table. Centers to median sagittal plane of body and table. May support feet with bench or stool. Has patient abduct thighs and lean directly forward until symphysis pubis is in close contact with table. May assist obese patient to achieve as close to a 45° angle of vertical axis of pelvis as possible. Has patient grasp ankles to maintain position. Directs central ray at right angles, centered to the lumbosacral region at level of greater trochanters, or directs central ray anteriorly at right angles to coronal plane of the symphysis pubis.

iv) For superoinferior axial projection of anterior pelvic bones, seats patient as above; has patient extend arms backward for support and lean backward so that the pubic arch is in a vertical position. Centers at level of the greater trochanters,with central ray at right angles to film. Includes sacrum and symphysis pubis within field.

v) For the PA projection (anterior view) of the anterior pelvic bones, has patient assume prone position. Centers to the median sagittal plane of body at level of greater trochanters, with no rotation of pelvis. Supports ankles. Directs central ray at right angles to film.

vi) For a semiaxial PA projection of the anterior pelvic bones, positions as above and directs central ray to midpoint at 35° cephalad.

b. For the femoral neck(s) and hip, performer notes whether requisition is for unilateral or bilateral study and the purpose. Selects positions depending on patient's ability to abduct femora. Has MD position if there is unhealed fracture. Performer localizes the long axis of the femoral neck (especially with atypical patients or where the extremity is not in anatomic position) by locating the anterior superior iliac spine and the upper margin of the symphysis pubis. Defines a line between them. Palpates the greater trochanter of the femur and marks a point one inch below its most prominent part. Defines a line from the point marked to the midpoint of the first line as the long axis of the femoral neck.

Performer locates the hip joint by defining a line between the anterior superior iliac spine and the symphysis pubis. Determines the midpoint and defines a line at right angles to the first line at the midpoint and finds a point on the second line about two inches below the first. Uses this point to center.

i) For inferosuperior projection (axiolateral view, "frog" position) of the femoral neck(s) and hip(s), performer notes whether unilateral or bilateral view is involved. For bilateral view has patient assume supine position with the medial sagittal plane of body aligned to midline of table, shoulders in a single transverse plane, elbows flexed, and hands resting on upper chest, with no rotation in body. Has patient flex knees and abduct thighs equally and as much as possible, with feet turned inward as close to the buttocks as possible so that femora are in a near verticle position. May apply compression band above hip joints. Centers and immobilizes feet. Adjusts equal abduction of thighs so that the long axes of femoral necks are parallel to plane of

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film. Adjusts central ray angle to parallel the long axes of femoral shafts centered to the symphysis pubis (or at right angles).

For unilateral projection using cassette tray,adjusts patient in AP pelvis position,centering anterior superior iliac spine of affected side to midline of table. Extends unaffected extremity. Supports with sandbags under knee and ankle. Has patient flex the hip and knee of the affected side and draw the foot up to the opposite knee. Directs central ray to central point located for hip joint (as described above). Has patient brace sole of foot against opposite knee and lean thigh lateralward about 40° with foot turned on its lateral side.

For unilateral projection using cassette on table top, has patient lie in AP supine position with affected leg extended and unaffected leg abducted,with knee flexed and foot on tabletop, or with leg hanging off table edge. Positions cassette vertically at patient's side with long axis parallel to long axis of femoral neck and as far as possible into depression above iliac crest.

Supports with sandbags. Inverts foot slightly. Directs central ray at right angles to long axis of femoral neck to hip joint point (as described above) and under the opposite knee if flexed.

ii) For superoinferior axiolateral projection of femoral neck, uses curved cassette. Has patient assume supine position with pelvis elevated enough to place greater trochanters four inches above table top. Supports affected extremity at hip level. Flexes hip and knee of unaffected side if not immobilized already.

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If not already abducted in cast or splint, abducts leg sufficiently to place cassette. Places cassette vertically well up between thighs, centered to the crease of the groin of affected side. If not already immobilized, inverts foot 15° to 20°. Immobilizes with sandbag. Directs central ray downward and medialward at right angles to long axis of femoral neck centered to lateral surface of hip above the soft tissue depression.

iii) For mediolateral projection(for axiolateral view of femoral neck),performer places patient in supine AP position with pelvis sufficiently elevated to place greater trochanters about six inches above table top. Supports hips. Places cassette vertically along lateral surface of the affected hip. Centers transverse line of cassette to greater trochanter,and tilts cassette backward 25°. Supports cassette in position. Angles central ray laterodorsally,directed to greater trochanter at 25° cephalad and 25° posterior centered to midsagittal plane of thigh.

iv) For AP projection (posterior view) of femoral neck and for use in calculating the shaft-neck angle, performer has patient assume supine AP position with sagittal plane lying one inch medial to anterior superior iliac spine,centered to midline of table. Performer abducts leg slightly and rotates thigh internally about 20°. Immobilizes. Localizes the long axis of the femoral neck as described above,and finds midpoint

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of the femoral neck (about two inches below its intersection with the line between anterior superior iliac spine and upper margin of symphysis pubis). If shaft-neck angle is to be calculated from this view, performer marks midpoint with a small lead marker. Performer centers central ray at right angles to film directed to center of femoral neck, regardless of position of film, and includes at least six inches of the shaft of the femur in the field. Uses processed radiograph for calculation of shaft-neck angle.

v) For inferosuperior projection of femoral neck (axiolateral projection based on shaft-neck angle calculation), performer obtains processed AP projection as described above. Places tracing paper over radiograph and draws in outline of femur and midpoint of femoral neck as indicated by lead marker. Performer locates point on lateral side of greater trochanter one inch below the most prominent lateral projection and marks it on outline. Connects that point with the marked midpoint of femoral neck to demonstrate long axis of femoral neck. Ascertains the position of the long axis of shaft of femur and draws it where it intersects the long axis of the femoral neck. Performer measures the obtuse angle formed by the intersection of the two lines and records as the shaft-neck angle. Subtracts 90° from the shaft-neck angle and records for use in abduction of thigh.

Has patient lie in supine position with hip and knee flexed so that thigh is at right angles to the table. Abducts the thigh to the angle calculated above (thus placing femoral neck parallel to table). Supports leg. Centers cassette in bucky tray to the femoral neck and directs central ray at right angles to the midpoint.

c. For the hip and hip joint, performer notes whether bilateral or unilateral views are required; makes sure that there is no danger of fragment displacement, injury, or presence of unhealed fracture or destructive disease before having patient assume any lateral body positions. For bilateral superoinferior profile view of acetabula rehearses patient to retain position so that second view can be exposed on the same film after shift of x-ray tube and film.

i) For AP projection (posterior view) of hip, has patient assume supine position with knees and ankles supported. For bilateral study centers the sagittal plane two inches medial to the anterior superior iliac spine to the midline of table, aligning parts with no rotation of pelvis, and with elbows flexed in comfortable position, and shoulders in a single transverse plane. Unless there are contraindications, inverts feet so as to place long axes of femora parallel to plane of film. Immobilizes feet. For unilateral projection aligns affected hip to midline. Locates hip joint as described in (b), above. Centers to level of highest point of greater trochanter and directs central ray at right angles to film.

ii) For lateral projection of hip joint, has patient turn toward affected side in a near lateral

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position and grasp table side for support. Centers affected hip to midline. Has patient flex affected knee and draw thigh up to near right-angle flexion. Has patient extend opposite thigh; supports at hip level. Adjusts pelvis so that upper side is rotated slightly backward. Locates hip joint as described in (b), above. Directs central ray to that point at right angles or to 20° to 25° cephalad, as ordered.

iii) For inferosuperior projection, (axiolateral view) of hip, has patient assume lateral recumbent position on affected side. Has patient grasp side of table for support. Centers midaxillary plane of body to midline of table. Extends affected extremity to lateral position and immobilizes. Rolls upper, unaffected side backward gently about 10° and supports. Directs central ray to femoral neck at 35° cephalad or 15° to 20° if so ordered.

iv) For posterolateral position, performer begins with same positioning as above; rolls upper, unaffected side forward about 15° and supports. Centers to the level of the greater trochanter and directs centray ray at right angles. Performer may also position as above, but with patient lying on unaffected side.

v) For posterior oblique projection of hip joint, performer has patient assume semiprone position. Centers affected hip so that posterior surface of affected iliac bone is at the midline. Elevates unaffected side 40° to 45° and has patient support self on flexed knee and forearm of unaffected side. Centers to level of superior border of greater trochanter. Directs central ray at right angles to film, passing between posterior surface of iliac blade and dislocated femoral head.

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vi) For anterior oblique projection (posterior oblique view) of ilium, performer has patient assume a supine position with the sagittal plane passing through the hip joint of affected side, centered to midline of table. Elevates unaffected side 40° and supports elevated shoulder, hip and knee. Adjusts unaffected leg and thigh so that the anterior superior iliac spines are in a single transverse plane. Centers to anterior superior iliac spine and directs central ray at right angles to film.

vii) For posterior oblique projection (anterior oblique view) of ilium, performer has patient assume prone position (or lateral recumbent) and centers as above. Elevates unaffected side about 40° or so that transverse plane of pelvis is at a 45° angle. Has patient rest on forearm and flexed knee of unaffected side. Adjusts upper thigh so that the anterior superior iliac spines are in a single transverse plane. Centers as above and directs central ray at right angles.

viii) For bilateral profile view, superoinferior projection of acetabula, performer restricts radiation to one half of film at a time by using extension cones or masking cassette. Rehearses patient so that position will be retained for two separate exposures on the film, one for each side. Has patient

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seated on a side of the x-ray table far enough back so that posterior surface of knees are in contact with edge of table. Centers transverse axis of film to midaxillary plane of body. Arranges, if appropriate,to have grid shift appropriately for second exposure. Performer centers the midline of the longitudinal half of the film opposite the side being examined to the median sagittal plane of body and marks for reference when second exposure is made.Centers unaffected side for first exposure to the median sagittal plane of body. Has patient sit erect with thighs together and arms crossed over chest. Centers beam to the crest of the ilium on the affected side at a medial angle of 30° from one side. After first exposure,performer has patient hold position while film is moved into position for second exposure. Centers beam to crest of the opposite ilium at a medial angle of 30° from the other side.

ix) For posterior oblique projection of acetabulum,performer has patient assume semiprone position on affected side supported on forearm and flexed knee of unaffected side. Centers affected hip to midline of table. Adjusts elevation of unaffected side so that anterior surface of body is at a 38° angle with tabletop. Supports flexed knee and ankles. Centers beam through acetabulum at 12° cephalad at a point about two inches above gluteal fold and two inches lateral to median sagittal plane.

x) For anterior oblique projection of acetabulum, has patient assume supine position. Centers sagittal plane passing through anterior superior iliac spine to midline and elevates affected hip 60°. Centers at level of upper border of greater trochanter. Directs central ray at right angles to midpoint of film.

d. If, during positioning, patient shows signs of severe pain, performer may notify appropriate physician at once and await orders or may decide on alternative positioning to avoid movement of the affected part.

e. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size (or the size of the unshielded area of the film to be exposed). Uses cross-hair shadows as reference for center of field. Uses the collimator light to center the patient to the x-ray field, or centers the part to the film holder and uses the collimator light to center the tube to the part. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired. May readjust tube position lengthwise or crosswise to provide better centering.

13. Once the patient has been positioned and immobilized,performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). For small fields performer may attach an auxiliary extension cone to collimator to further reduce the primary

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beam. Adjusts primary beam to minimum size needed to cover the part(s) of interest.

14. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that protective shielding has been provided to patient and everyone who will remain in room.

15. Throughout procedure performer observes patient for any signs of emergency and/or to prevent or respond to an accident. Is alert to signs of nausea, dizziness or sweat suggesting faintness. Performer may have patient lie down, lower head or raise legs. Notifies nurse. If patient shows any other emergency signs, loses consciousness, or has an accident,performer calls appropriate physician or nurse at once. May decide to provide emergency first aid as well. If a patient's catheter becomes disconnected, performer clamps it and immediately notifies nurse. If catheter should come out, notifies nurse at once.

16. When everything is ready for the exposure, performer explains to patient what breath control will be used for exposure (primarily holding breath) when told to do so by performer and holding still until told to relax. Reminds patient about those exposures in which position is to be retained for a second exposure. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

17. The performer returns to control room. Makes sure controls are properly set and patient is still in position.Tells patient when to hold breath and/or hold still by calling or using intercom.

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Performer initiates exposure by pressing hand trigger or exposure control button.

a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.
c. With phototimer notes whether back-up timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure (due to underexposure if premature cut-off, or overexposure due to faulty timer).
d. After exposure is completed tells patient that he or she can relax.
e. If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

18. Performer returns to patient. Removes cassette or film holder from table, floor,or bucky.

a. Removes any markers for further use. If multiple views are to be taken on the film, removes leaded rubber mask and remasks all but next area to be exposed.
b. If the patient is being examined for a possible fracture or if so requested, performer arranges to have the first exposure processed at once and brought to the appropriate radiologist.

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c. Depending on whether radiologist will evaluate radiographs before completion of all possible exposures for the series, performer arranges to process film(s) and evaluate for quality control personally, have this done, or bring to darkroom for processing and later evaluation, based on time available, institutional arrangements,or specific instructions. Attaches ID card for use with flasher if appropriate. May sign requisition.

d. While films are being processed and/or evaluated performer has patient relax in examination room or holding area. Explains what will happen next.
  - i) Performer determines whether patient should remain on table and/or in room or requires observation. May consult requisition sheet or attending RN. If appropriate, makes sure that patient will be attended while waiting.
  - ii) If appropriate, moves x-ray tube and any protruding film holder away from patient before patient rises.
  - iii) May decide to assist patient to chair or stretcher or from table, Makes sure patient is reminded of any footrest in stepping off table.

19. When (or if) performer learns from the radiologist the extent of the injury and/or whether further conventional views and/or positions can be undertaken, eliminated or altered, performer proceeds as appropriate according to instructions.

a. For further exposures performer repeats appropriate steps for next view(s) including identification of film holder or cassette and use of R-L marker, selection and setting of technique for next view (if different), positioning patient and equipment for focus-object-film alignment, proper collimation and shielding, and making exposure, as described above.

b. Performer refrains from commenting on the films or providing any interpretation.

c. If performer is asked to repeat any exposures, makes sure that the additional exposures are warranted medically, since additional radiation will be incurred.
  - i) Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."
  - ii) If request for retakes reflects malfunctioning equipment performer reports malfunction to appropriate staff member.
  - iii) If request for retakes reflects the preference for density or contrast of a radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.

20. When performer is sure that the examination has been completed, performer may have patient transported back to holding area or next location or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient as described above.

21. Performer carries out termination steps for the examination:

a. Performer has equipment and examination table cleaned after use or decides to do personally,depending on institutional arrangements.

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b. Performer records the examination according to institutional procedures. May include date, room, examination type, the views taken, the technical factors used and film sizes; may record the number of exposures made of each view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. If any views called for in the initial request could not be obtained, performer may record reasons. Signs requisition sheet. c. Performer may decide to jacket films, requisition sheets, and related materials and/or have information recorded in log book, or has this done, depending on institutional procedures. d. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

TASK DESCRIPTION SHEET

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This is page 1 of 28 for this task.

1. **What is the output of this task?** (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured,positioned;parts measured;films identified;technical factors selected and set;technique for magnification set up;exposures made;radiographs sent for processing and evaluation; procedures repeated as appropriate for full set of views;patient returned;examination recorded;radiographs placed for use.

2. **What is used in performing this task?** (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, technical history;pen;x-ray machine control panel(s), tube(s),bucky,table,collimator,extension cones;technique chart;charts for conversion of technique,standard examination views,dosage,tube capacity;loaded cassettes;vertical film holder;leaded rubber shielding;R-L and ID markers;immobilization and support devices;stool;calipers;tape;scissors;protractor;compression band;stretcher or wheelchair;marking pen; drape;head clamp

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. **If "Yes" to q. 3:** Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-infant patient to be radiographed;radiologic technologist;radiologist;nurse

5. **Name the task** so that the answers to questions 1-4 are reflected. Underline essential words.

Taking plain film radiographs of vertebral column of non-infant patient by reviewing request;reporting observed contraindications;reassuring pt.;measuring part;setting up for magnification technique;selecting and setting technical factors;identifying film; positioning pt. and equipment for erect or recumbent exposure;providing shielding;collimating;making exposure;having radiographs processed and reviewed;repeating for full set of views or as ordered;having pt. returned;placing radiographs for use;recording examination.

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Performer receives or obtains the x-ray requisition form, patient's identification card, and any appropriate medical-technical history for a non-infant patient scheduled for radiography of the vertebral column (cervical,thoracic and/or lumbar spine and/or sacrum, coccyx):

a. After checking assignment on schedule sheet.
b. From co-worker.
c. After having arranged requisitions in order of priority.

The plain films of the spine may serve as preliminary "scout" films for contrast studies such as myelography or discography; the plain films of the cervial,thoracic, and/or lumbar spine may be part of a bone-survey. The requisition may call for a scoliosis or spinal fusion series.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided:

   a. Performer checks the examinations called for including the parts involved and the affected areas (especially for spinal fusion study), whether bilateral or unilateral views are requested, the patient positions and views called

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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for, the number of exposures, the central beam angulation, the areas of interest and parts to be included. Notes whether there will be multiple views on a single film, whether the use of a grid or bucky will be involved. Notes any request for magnification. Checks the name of the referring physician.

b. Performer reads patient's name, identification number, sex, age, weight, height. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information that will affect patient positioning, technique, or handling of the patient, such as presence of accident injuries, unhealed fracture, suspected fracture, degenerating disease, presence of plaster cast, whether patient will be on a stretcher or wheelchair, the nature of any known pathology which would affect technique (such as bone infection), and the purpose of the study.

c. With patients with accident injuries or unhealed fractures, performer may make sure that a surgeon or radiologist is available to position the patient.

d. Performer checks whether patient is suffering from a collateral condition requiring special handling, such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter or similar device in place; notes whether patient will be accompanied by nurse or other staff person.

e. If studies of the lumbar-lumbosacral vertebrae, sacrum, or coccyx have been ordered, performer checks whether there were orders for prior preparation such as administration of cathartic and/or enema, evacuation, and/or emptying of urinary bladder just prior to examination. If ordered, performer checks to be sure these were carried out; if not, arranges for patient to evacuate and/or empty bladder.

f. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved. Goes to examination room or control room for machine involved. If oblique PA projection of cervical intervertebrate foramina has been ordered, notes whether bi-plane study is involved. If so, checks that proper equipment is available in room.

g. If magnification has been requested, performer checks that the machine to be used has a fractional focal spot of appropriate size for direct magnification technique (i.e., 0.3 mm or smaller).

h. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete. Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

i. Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether number of radiographic exposures ordered or done in past should be brought to radiologist's attention.

j. Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus. Notes shielding needed.

k. If patient's record indicates orders for sedation or any other

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prior medication, performer may check timing to be sure a proper elapse of time has occurred for medication to take effect. May arrange to delay examination if appropriate.

1. If referring physician has requested that films already on file be sent with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer notifies supervisor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

3. When performer is clear about what will be involved in examination, he or she prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Performer reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).
   b. Performer washes hands as appropriate; depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
   c. Performer makes sure that x-ray equipment is ready for use. Goes to control panel for x-ray generator

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and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for machine to "warm up." If appropriate, performer may set radiography mode selector and set collimator control for manual operation.

   d. Performer checks that appropriate immobilization devices such as sandbags, wedge sponges, compression band, gauze bandage are present and that there is a mattress, pads, pillows, and/or blankets for comfort of patient if patient will lie on table. If appropriate, obtains protractor, cardboard triangles, cassette tunnels, weights, device to support erect patient, objects to stand on to compensate for (or create) spinal curvature, or limbs of unequal length.
   e. Checks that there is leaded rubber shielding available in room to be used to mask film, protect the patient, and/or to place beneath the film holder, as appropriate.
   f. Performer prepares for identification of the films using equipment provided by institution:
      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
      iii) Checks identification against requisition sheet.
      iv) Performer makes sure that right (R) and left (L) markers are available for use.

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4. If magnification has been requested, performer prepares the equipment for the tube-over-table method of magnification (used without bucky):

   a. Performer determines the degree of magnification requested on the requisition sheet; if the request is expressed as an area magnification performer determines the linear magnification by taking the square root. (Linear magnification squared equals area magnification.)
   b. Performer calculates the required distances from target (focal spot) to object (patient) (TOD), and from object to film (OFD), as well as the distance from target to film (TFD) (the sum of TOD and OFD):
      i) If the distance from the table top to a cassette placed on the floor or a stool (OFD) will be a relatively inflexible distance, performer measures this distance or reads indicator scale. (If stool is to be used, may note the table height.) Performer may adjust table height to provide for a round number for the OFD.
      ii) If the distance from the focal spot to the table top (TOD) will be the relatively inflexible distance, performer determines what this is by measuring or reading appropriate indicator scale on tube housing. Performer may adjust tube height to provide a round number for the TOD.
      iii) Depending on whether the OFD or the TOD is fixed, performer calculates the required complementary distance by referring to a magnification chart for the degree of linear magnification required, or uses the formula: degree of linear magnification equals TFD divided by TOD. For a two-times linear magnification performer simply sets the TOD equal to the OFD.
      iv) Performer adjusts and locks the table height and/or the tube height to the calculated OFD and TOD.
   c. Performer aligns the object-film and target-object distances:
      i) Performer moves the x-ray tube housing until it is centered over the table top in the approximate area where the patient's area of interest will be positioned, such as on table.
      ii) Performer swings the table out of the way so that there is no obstruction between the tube and the floor. (Does not change height.) If appropriate, places a stool on the floor under the tube. May place cassette of appropriate size on floor or stool. Performer selects the size film designated for the degree of magnification and the selected part to be studied.
      iii) Performer adjusts the collimation to correspond to the field size anticipated (for the TOD involved).
      iv) Performer activates the light in the collimator and adjusts the tube horizontally so that the light beam cast is centered to the cassette on the stool or floor. Uses the cross-hairs projected by the beam to center the tube to the area on the floor or stool.
      v) Performer locks the tube into position so that there is a 90° angle of the beam with the floor or stool. Fixes and retains collimator setting.
      vi) Performer marks the outline of the collimated light area or cassette on the floor or stool using tape or other removable

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marker. If not already done, checks by placing cassette in marked area. May mark center of area as shown by cross-hairs.

vii) Performer swings table back into place. Activates light beam in collimator and marks the table top where the center cross-hairs and light outline are projected (to be used to center the part to be radiographed). Uses tape or other radiolucent removable marker.

viii) Performer may recheck TOD and OFD to be sure that they correspond to the calculated distances.

d. For magnification technique using a vertical film holder, performer may wait until patient has been brought into examination room. Adjusts upright holder to appropriate height; adjusts x-ray tube to right-angle projection of beam to film holder; centers to the film; measures and adjusts TOD to patient's position and marks patient's position; measures and adjusts OFD from patient's position as marked.

e. If the sum of the new TOD and OFD (TFD) is now different from the TFD used for non-magnification technique, performer may consult technique chart to note the factor to use for a compensatory change in mAs. May record for later use in setting exposure factors.

f. Performer may also note the change in kVp and mAs necessary to compensate for any change in collimation from non-magnification technique. Consults appropriate charts for conversion factors. May record.

5. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

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a. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

b. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

c. Has patient assume a comfortable position seated on table or chair. If patient is in wheelchair, moves patient in chair into position next to table. If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move patient to table. With accident patient uses upright film holder with patient remaining on stretcher until injury has been localized.

d. Performer explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

e. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains when asked medical questions that it is not appropriate for

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technologist to answer these; encourages patient to speak to physician.

f. If patient has an IV drip in place, performer checks that needle has not become dislodged and that the fluid is dripping at an even rate. If there are any problems, performer clamps tube and notifies an appropriate staff person at once.

g. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs appropriate physician and proceeds only with approval.

h. If not already done, has patient with cervical spine involvement remove dentures, hair pins, and any jewelry around neck. Makes sure that all garments except gown are removed down to below the area of interest. For views of thoracic and lower spinal areas makes sure that patient has an open back gown. Keeps body covered until ready for positioning and exposure. Reveals only as much of body as necessary. Treats young patient with as much courtesy as adult. If there is a wet dressing, performer has it reinforced or decides to do personally.

6. Performer questions patient and/or RN or MD present on what movement is possible to determine what positions are available for use.

   a. When there is unhealed fracture or degenerating disease of upper cervical region, is careful to note whether any requested positions involve axial positions or rotation of head. Does not attempt without checking with MD, and has MD position patient.

   b. If patient has had a severe injury to the cervical or thoracic spine and arrives on stretcher or bed, performer plans for radiographic positioning of film and x-ray tube with patient on stretcher and without rotating patient. If any manipulation of patient's head is required, performer has physician carry this out.

   c. For cervical and thoracic vertebrae, notes whether patient will be able to hyperextend head for AP projection or whether oblique projections should be substituted.

   d. Performer notes whether patient can assume erect position for projection where this is an option. Chooses erect standing or seated position where possible except for patient with standing or sitting difficulty or with cardiac condition.

   e. Notes whether patient's extremities are of unequal length, whether any swelling or atrophy of the soft tissue will cause rotation of the pelvis when patient is recumbent. Notes whether adjustments will be necessary for excessive muscularity or fatty tissue, whether thin patient will need padding under bony prominences.

   f. Performer considers the number and types of projections ordered for the examination and the patient's condition. Performer may consider a change from standard projections to better accomplish the purpose of the examination, or deletion of a position, or a change in technical factors. Depending on institutional arrangements, performer may obtain permission from appropriate radiologist or decides personally to alter the standard procedure.

7. Depending on whether a bucky or table top technique will be used and stan-

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dard institutional practices, performer selects speed and type of film,grid, and cassette combination.

a. Selects size(s) based on the area(s) to be included, the patient's size, and whether bilateral views are to be exposed on a single film.
b. For frontal and lateral projections of the lumbar-lumbosacral vertebrae, performer assesses whether to utilize a single cassette large enough to accommodate the area of interest or use two films, one centered to the third lumbar body and one at the lumbosacral joint.
c. For magnification technique, performer selects the size film designated for the degree of magnification and the selected area to be studied.
d. Performer makes sure that an adequate supply of loaded cassettes of the types and sizes selected are available in the examination room. If not, arranges to obtain or decides to obtain personally.

8. Performer prepares for the examination:

a. Performer obtains the appropriate size loaded cassette for the first projection.
b. If bilateral exposures will be taken on one film, performer mentally decides how these will be positioned so that the film need not be turned for viewing each image. Performer uses leaded rubber sheets and masks the cassette completely except for the area to be exposed. Treats the area to be exposed from this point as though it were the actual film size.
c. Performer attaches identification information to the cassette or table top:

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i) Places right or left marker on film holder or table-top as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.
ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of cassette.
iii) If patient identification information is to be entered by use of flasher, sets flashcard aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.
iv) Performer may place patient's card into card tray for equipment using automatic film marking device.

d. If cassette is to be used with bucky (under tabletop or in upright holder) performer may manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.
e. If a bucky is not being used, performer places cassette in a position that can be comfortably reached by the patient in final positioning.
   i) If magnification technique is to be used, performer places cassette in marked position on floor or stool.
   ii) If appropriate to make possible minimal movement of patient, performer may place cassette in upright holder at right angles to table top or in other position selected.

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   iii) With accident patient, after localization has been established, performer may obtain assistance in lifting any part under which a cassette must be placed while the injured extremity is supported.

f. Performer provides patient and everyone who will remain in room during exposure with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

9. Performer has patient assume a comfortable recumbent or seated position depending on the positions to be employed, so that the part(s) to be radiographed can be measured in position.

   a. If appropriate, places mattress, pillow, or clean linen on x-ray table.
   b. Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way and may be collided with by patient. Locks chair.
   c. If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.
   d. Performer uses centimeter calipers to measure the thickness of the part(s) to be radiographed in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors.
      i) With fractures or accident patient, may have surgeon or radiologist position the patient.
      ii) In locating iliac crest, performer is careful not to center too high by making sure not to confuse the iliac crest with the heavy muscles immediately above the crest. May have patient inhale deeply and breathe out; then palpates the point of the crest while the muscles are relaxed.
      iii) If performer believes that patient will be embarrassed by palpation of the symphysis pubis, uses the most prominent point of the greater trochanter to locate the same transverse plane.
      iv) If patient has a urinary catheter in place, performer turns patient toward the catheter and tubing to prevent separating it from drainage bottle and breaking sterile system and to avoid causing pain.
   e. After measuring, has patient rest in as relaxed a position as possible. May place pad, blanket or pillow under bony prominences to provide comfort.

10. Performer selects the exposure factors for the first projection by consulting the technique chart(s) posted for the machine:

   a. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other accessories that are possible (such as screens, grids, bucky, etc.).
   b. Makes note of the kVp, mA, T (seconds of exposure time), focal spot size, and the focal film distance (TFD or FFD) called for.

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c. Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for a pathological condition, change in TFD, extreme fat or muscularity, preference of the radiologist involved, and any other conversion needed such as with magnification technique. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate.

d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

11. Performer sets exposure factors as selected:

   a. Enters control room. Makes sure that indicator light shows that x-ray generator is ready for use. Makes sure that all circuits have been stabilized.
   b. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.
   c. For conventional exposure control:
      i) Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.
      ii) Performer selects and sets the exposure time that will produce the mAs desired.
      iii) Performer sets the kVp selected by choosing the combination of

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major kilovoltage and minor kilovoltage settings to produce the desired kVp.

   d. For automatic phototimed exposure control:
      i) Performer selects and sets the category corresponding to the type of study and use or non-use of screens, bucky, etc., and, if appropriate, focal spot size.
      ii) Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).
      iii) May select and set a kVp range button (if called for with equipment) corresponding to range for examination.
      iv) Sets a density selector corresponding to the usual (or special) requirements for the study.
      v) Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.
   e. Depending on the equipment, may set controls to provide for use of bucky, manual tableside adjustment of table and tube height, position, and of collimation (unless these have already been set as with magnification technique).
   f. Performer returns to overhead unit and sets the focal-film distance (if not already done, as with magnification technique). Operates controls or manually moves the x-ray tube into place over the film holder (or at right angles to upright holder). Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.

12. Performer prepares the part to be radiographed in the final position se-

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lected for the first exposure (unless this is done by physician).

a. May explain or demonstrate to patient what is required. May obtain help in positioning or has MD position in accident and fracture cases.
b. Performer centers part and keeps the long axis of the part parallel to the film holder. When using a bucky, centers patient to midline. With cassette on table top, centers film to part. With upright holder, adjusts height of holder to part and centers part to film.
c. When positioning a patient with a balloon catheter in place, performer makes sure that the clamp is not lying over a part to be exposed or that patient is not lying on the clamp.

13. Performer positions as follows (unless nonconventional positioning is being used to avoid having patient move):

a. For studies of the cervical vertebrae, including entire cervical column, occipitocervical articulations, the atlas, odontoid processes of axis, axis, and the lower cervical intervertebral foramina, the performer first determines whether a severe injury of the cervical spine may be involved requiring special non-manipulative positioning for AP and lateral projections (to ascertain the nature and extent of injury) and whether manipulation of the patient's head is to be performed by a physician. Arranges for the latter as appropriate. Takes lateral view of cervical spine as part of bone-survey.

i) For AP projection (posterior view) of cervical vertebrae when patient is on stretcher and cannot be moved, performer draws bottom sheet of stretcher or bed

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tight. Holds patient's head to prevent it from turning, and lifts head only enough to slip cassette into position. Performer positions x-ray tube to a 15° to 20° cephalad angle if the vertebral bodies and interspaces are to be studied, and/or 20° to 30° caudad for posterior vertebral elements, articular pillars and facets, laminae, and spinous processes. May include upper thoracic vertebrae in field.

For conventional AP projection (posterior view) of cervical vertebrae, has patient lie in supine position with mid-sagittal plane of body centered to midline of table. Has arms placed alongside body with shoulders in a single transverse plane. Supports ankles. May place pad under patient's head. Adjusts head so that its median saggital plane is at right angles to table top. Elevates chin so that edges of upper incisors and mastoid tips lie in same transverse plane. Performer immobilizes head with head clamp. Explains what will be needed during exposure. May have patient practice opening and closing mouth until this is done smoothly and rapidly without the teeth striking together if this will be required during the duration of the exposure. Centers cassette to level of fourth cervical vertebra and directs central ray at right angles to midpoint of film.

ii) For lateral projection of cervical vertebrae when patient is on stretcher or bed and cannot be moved, performer adjusts cassette in vertical position in

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upright holder so that lower portion is in contact with shoulder. Centers to the fourth cervical vertebra and immobilizes. For seventh cervical vertebra may have patient assist in holding shoulders down by first looping bandage around patient's feet, having knees slightly flexed,and having patient grasp bandage ends and extend knees. May have co-worker depress shoulders by pulling on arms with symmetrical traction. Centers beam at right angles to film across table.

For conventional lateral projection of cervical spine,performer selects seated or standing lateral position and adjusts vertical cassette stand to center at fourth cervical segment with patient sitting or standing straight. Has patient rest adjacent shoulder against stand. Centers coronal plane passing through tips of the mastoid processes or level of external auditory meatus to midline of film. Rotates rounded shoulders forward and normal shoulders backward with shoulders in single transverse plane. Has patient hold sandbags of equal weight to depress shoulders or grasp and pull on gauze strip as described above. Adjusts lateral position of body with long axis of cervical vertebrae parallel with film. Elevates chin slightly and adjusts median sagittal plane of head to right angles with floor. Has patient fix view on a single spot straight ahead during exposure.

For lateral projections used in flexion-extension studies, performer positions as above, with

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median sagittal plane of head and neck parallel with plane of film. Has patient drop head forward and draw chin in close to spine for first exposure. For second exposure has patient elevate chin as much as possible. Centers beam as above.

For lateral projections used in study of spinal processes of the cervicothoracic spine, positions as above in front of upright bucky holder. Centers film and central beam at level of second or third thoracic vertebra. Rotates shoulders forward and down and has patient grasp knees or cross forearms and grasp upper arms. Has patient drop head forward and pull chin down. Centers the cervicothoracic vertebrae to the midline of film,and beam as above.

iii) For PA projection of occipitocervical articulations,performer places patient in prone position and centers median sagittal plane of body to midline of table. May place pad under chest. Has patient flex elbows and place arms in comfortable position. Adjusts shoulders so that they lie in a single transverse plane. Supports ankles. Has patient rest head on forehead and nose,with median sagittal plane at right angles to film or table and orbitomeatal line vertical to table. Centers to the level of the infraorbital margins. Immobilizes head with clamp or band. Directs central ray at right angles to midpoint of film.

iv) For oblique anteroposterior projection of occipitocervical articulations, performer may

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plan to expose both sides (with two exposures side by side on one film) for comparison. Has patient assume supine position. Centers median sagittal plane of body and aligns shoulders as above. Centers cassette under patient's head (with reference to unmasked portion) at level of external auditory meatuses, one inch lateral to median sagittal plane of head. Rotates head away from the side of interest so that midpoint of the orbit is at right angles to film. Adjusts flexion so that the infraorbitomeatal line is at right angles to film. Immobilizes head with head clamp or sandbags. Directs central ray at right angles to midpoint of film.

Performer may turn the head 40° to 50° to the side of interest, have patient open mouth, and draw chin down as much as open mouth will allow. Directs central ray at right angles through open mouth to the mastoid tip of the affected side. Repeats as appropriate for unaffected side.

v) For the anteroposterior projection (posterior open-mouth view) of the atlas and axis, performer has patient assume supine position. Aligns mid-sagittal plane of skull to midline of table, with arms at sides of body and shoulders in a single transverse plane. Performer places the cassette under the patient's neck, centered to the median sagittal plane at the level of the second cervical segment. Places towel or pad to prevent cassette from slipping. Has patient open mouth as wide as possible and adjusts head so that a line from lower edge of upper incisors to tip of mastoid process is at right angles to film. Immobilizes head. Directs central ray at right angles to midpoint of open mouth. Has patient practice keeping mouth wide open and softly phonating the sound "ah" during the exposure.

vi) For the lateral projection of the atlas and axis, performer starts from the AP position as described above, with patient supine or erect. Places cassette holder alongside patient's head, in contact with upper neck, centered one inch distal to the tip of the mastoid process, with cassette parallel with median sagittal plane of neck. Extends patient's chin slightly. Supports cassette if patient is supine and immobilizes head. Directs central ray at right angles to midpoint of film.

vii) For AP projection (posterior view) of odontoid process of axis, performer makes sure that there is no fracture or degenerating disease of the upper cervical region. Starts from AP position as described in (v) above, with cassette centered to the median sagittal plane at the level of the tips of the mastoid processes and supported. Performer tips the patient's head backward so that a line passing through the tip of the chin and the tip of the mastoid process is at right angles to table as well as the median sagittal plane of the head. Immobilizes head and directs central ray to midpoint of film.

viii) For anterior oblique projection (posterior oblique view) of odontoid process, performer notes whether a bilateral study is requested (with two exposures side by side on the film).

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Checks that head can be rotated. May rotate entire body instead. Starts from AP position as described in (v), above, with unmasked half of film centered as in (vi), above. Rotates the head 40° to 45° away from the side of interest for the first exposure (and towards the side of interest for the second exposure), so that the infraorbitomeatal line is at right angles with table. Immobilizes head. Directs central ray at 10° to 15° caudad, centered to a point midway between the outer canthus and the external auditory meatus.

ix) For PA projection (anterior view) of atlas and odontoid process (or semiaxial projection), performer first rules out the presence of unhealed fracture or destructive disease of the upper cervical region. Places patient in prone position, centering the median sagittal plane of body to the midline of table. Has patient flex elbows and place arms in comfortable position with shoulders in a single transverse plane. Supports ankles. Places cassette transversely. For semiaxial projection inclines cassette 23° caudad and supports to prevent slippage. Then has patient extend chin and rest it on upper border of cassette. Adjusts head so that the median sagittal plane is vertical. Centers film to median sagittal plane of throat about 1.5 inches distal to tip of mastoid process. Immobilizes head. Directs central ray at right angles to midpoint of film. If bucky is to be used for semiaxial projection, adjusts angle of central beam to compensate for lack of angulation of cassette and directs beam midway through the mastoid tips.

x) For AP projection (posterior view) of the lower cervical vertebrae, performer selects erect or supine position and has patient assume the AP position as described above. Centers the median sagittal plane of the body to the midline of table or upright holder with shoulders in a single transverse plane. Extends the chin so that the occlusal plane and mastoid tips are in a single transverse plane. Directs central ray through the fourth cervical body at 15° to 20° cephalad, and centers film to point of entry of beam. For cervical ribs, directs central ray at right angles through the seventh cervical vertebra. Rehearses with patient how to softly phonate the sound "mmm" during exposure.

xi) For oblique AP projection (oblique posterior view) of cervical intervertebral foramina when patient is on stretcher and cannot be moved, performer draws bottom sheet on stretcher or bed tight. Holds patient's head to prevent it from turning, and lifts head only enough to slip cassette into position, placing the midline of the film about 3 inches lateral to the median sagittal plane of the neck near the side opposite the side being studied at the level of the third cervical body. Directs the central ray from the side of interest to the fourth cervical vertebra at 45° toward the median sagittal plane and at 15° to 20° cephalad.

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For conventional oblique AP projection of cervical intervertebral foramina, has patient assume erect AP position if possible. Notes whether both sides are to be radiographed for comparison. Performer has patient assume AP position seated or standing facing away from film holder or supine. Adjusts body rotation to a 45° angle of midsagittal plane with the table or upright holder, (using a protractor). Centers cervical spine at the midline of the film one inch proximal to the most prominent point of the thyroid cartilage. For semisupine position, supports lower thorax, elevated hip, and head so that the cervical column is parallel to table top. May immobilize head. Directs central ray to the fourth cervical vertebra at 15° to 20° cephalad. Takes second exposure with patient in reverse position to demonstrate the other side. Rehearses with patient the soft phonation of the sound "mmm" during exposure.

xii) For oblique PA projection (oblique anterior view) of cervical intervertebral foramina, has patient assume erect position if possible or lie prone on table. Notes whether both sides are to be radiographed for comparison, whether bi-plane or flexion-extension studies are involved. Performer keeps the shoulder on the side of interest adjacent to the film in upright holder or bucky (for the first exposure; the opposite-side shoulder for the second exposure), with patient facing towards film. Turns body until midsagittal plane is at 45° to film. For prone patients centers to midline and has patient support self on forearm and flexed knee of elevated side, and supports ankles, knee, and head so that long axis of cervical column is parallel with film. Uses protractor to check body rotation. Adjusts patient's head so that median sagittal plane is in same line as spine. Extends or elevates the chin slightly. May immobilize head. Directs central ray to the fourth cervical vertebra at 15° to 20° caudad to parallel the angle of the foramina. May have patient grasp side of holder with hand on side away from film. Has patient practice "mmm" phonation as described above. Takes second exposure with patient in reverse position to demonstrate other side.

For flexion-extension studies, has patient assume direct PA position seated or standing with shoulders held against upright film holder. For first exposure rotates head maximally to one side and has patient flex neck. For second exposure has patient extend neck in same rotated position. For third and fourth exposures (to compare sides) has patient rotate head in reverse direction, flex, and then extend neck.

For bi-plane study, performer may use x-ray machine equipped with two x-ray tubes. Sets up two cassette tunnels so that the two cassettes are at right angles to each other and each at right angles to table, forming a "V" in which to support patient's head in prone position. Centers body to midline. Supports with pillow and ad-

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justs patient in comfortable PA position. Centers cassette tunnels to midline and under the head and neck at the level of the fourth cervical vertebra. Cushions and supports forehead and nose. Has orbitomeatal line and median sagittal plane at right angles to table. Directs tubes so that each central ray enters at right angles to midpoint of film from opposite side of head. If no bi-plane equipment is available, positions tube for one side for first exposure and repositions for other side while patient maintains position.

b. For studies of the cervical and upper thoracic vertebrae, thoracic vertebrae, and apophysial articulations, performer first determines whether an accident victim patient requires preliminary filming of lateral view of cervical and upper thoracic spine without being moved on or from stretcher or bed. For bone-survey, performer makes AP and lateral projections of the thoracic spine.

   1) For lateral projection of cervical and upper thoracic vertebrae when patient is on stretcher and cannot be moved, performer uses upright cassette holder for filming. May plan to make two exposures on a single film using an extension cone for the first exposure. If so, performer adjusts upright cassette holder next to stretcher or places a grid cassette upright on stretcher and supports so that x-ray beam may be directed across stretcher to film. Includes first and second thoracic vertabrae and all seven cervical vertebrae in the initial collimated field. Performer adds extension cone to tube,centered on the first and second thoracic and seventh cervical vertebrae. Performer directs central ray at right angles through extension cone for first exposure. Instructs patient not to move; removes cone and, with appropriate new exposure factors repeats exposure on same film to include the original field. Performer may repeat the lateral projection with a simple exposure of the field on a second cassette.

   For conventional lateral projection of cervical and upper thoracic vertebrae, performer selects erect seated or standing position or lateral recumbent position. Has patient sit or stand straight before an upright cassette holder in a lateral position or has patient lie in lateral recumbent position with head elevated and supported. Centers patient or film holder to the level of the second thoracic vertebra with the mid-axillary line of body at midline of film. For erect position has patient elevate the arm next to the cassette holder to a vertical position with elbow flexed and forearm resting on patient's head, with shoulder resting against holder for support. Adjusts head so that median sagittal plane is parallel with film.

   For recumbent position has patient extend the arm on the side next to the table so that the humeral head is either behind or in front of the vertebrae. Adjusts other arm in opposite direction. Provides support to head and lower thorax so that the long axis of the cervico-

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thoracic vertebrae is parallel to film.

Depresses shoulder away from film in either erect or recumbent position. Immobilizes by having patient grasp dorsal surface of thigh or an anchored hand-hold. Adjusts body in exact lateral position. If shoulder cannot be well depressed(or for recumbent position)directs central ray to midpoint of film at 3° to 5° caudad; otherwise at right angles.

ii) For AP projection (posterior view) of cervical and upper thoracic vertebrae, performer has patient assume supine position with median sagittal plane of body centered to midline of table,shoulders depressed,and in a single transverse plane. To depress shoulders may loop bandage around patient's feet while knees are slightly flexed. Has patient grasp bandage ends and extend knees. Places median sagittal plane of head at right angles to table and then assists patient to hyperextend the head;adjusts cassette so that upper edge of film is at level of the external auditory meatuses and centered to the 7th cervical vertebra. Depending on the extent of the cervical lordosis, directs central ray to coincide with the plane of the articular facets (about 20° to 30° caudad).

iii) For oblique AP projection (oblique posterior view) of cervical and upper thoracic vertebrae, performer starts from the AP position as described above. For views of both sides,rotates head 45° to 50° (or more as needed) to one side,and to the other side for second exposure. Directs central ray to seventh cervical vertebra,30° to 40° caudad.

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iv) For oblique PA projection (oblique anterior view) of cervical and upper thoracic vertebrae, performer has patient lie in prone position with median sagittal plane of body centered to midline and cassette placed so that distal edge of film is at the level of the tip of the seventh cervical spinous process. May provide soft support under chest. Depresses shoulders and aligns to a single transverse plane. For first exposure has patient rest head on one cheek; reverses for second exposure. Adjusts head so that its median sagittal plane is at 45° angle. To demonstrate 2nd to 5th cervical vertebrae, flexes head somewhat and immobilizes. For 5th to 7th cervical vertebrae and 1st to 4th thoracic vertebrae extends the head somewhat. Directs central ray to 7th cervical vertebra at 30° to 40° cephalad.

v) For AP projection (posterior view) of the thoracic vertebrae, performer decides on supine or erect position for patient. Positions patient so that median sagittal plane of body is centered at midline of table or vertical cassette holder,and long axis of x-ray-tube is parallel to this line, with the anode at the head end of the patient (to provide a view facing caudally) and the cathode on the side of the feet (to take advantage of "heel effect"). Centers film at the level of the sixth thoracic vertebra (3 to 4 inches distal to the manubrial notch). Places arms alongside

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body and adjusts shoulders to lie in a single transverse plane. With standing patient,compensates for extremities of unequal length and has patient stand with weight equally distributed. For supine patient,has hips and knees flexed enough to put the back in contact with table, with thighs in vertical position. Immobilizes feet. May support extended knees for patients unable to flex. Directs central ray to midpoint at right angles to film.

vi) For lateral projection of thoracic vertebrae, performer selects lateral recumbent or standing position (preferably left lateral with the heart on side closer to the film). Centers the midaxillary line of the body to the midline of the table or upright film holder,with midpoint at the level of the sixth thoracic vertebra. For erect position, has patient rest adjacent shoulder against holder for support, with weight distributed equally on both feet. Provides compensation support for extremity of unequal length. Has long axis of vertebral column parallel with film. Has patient raise arms forward at right angles to long axis of body. Has patient grasp support stand.
For lateral recumbent position, supports patient's head so that its median sagittal plane is in line with long axis of vertebral column. May support lower thoracic region. Has patient flex hips and knees. Elevates and supports lower knee to hip level; places sandbag on top and then superimposes upper knee. Supports ankles similarly. Adjusts upper arms forward at right angles to long axis of body and has lower

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hand rest under head. Has patient hold table edge with upper hand. Adjusts so that scapulae are in a single plane. Adjusts body in true lateral position. May apply compression band at level of trochanteric area of pelvis. Directs central ray at right angles to midpoint of film or at right angles to long axis of thoracic column centered at the sixth thoracic vertebra.

vii) For oblique projection(s) of the apophysial articulations of the thoracic vertebrae, performer notes whether forward rotation (for posterior oblique projection) or backward rotation (for anterior oblique projection) is to be employed (the latter as substitution for direct lateral of cervicothoracic area). Uses same direction of rotation for both exposures in bilateral studies. Decides whether to position patient in erect standing or lateral recumbent position. Performer starts by positioning patient in erect lateral or lateral recumbent position as described above. For erect position has patient flex elbow of arm adjacent to stand and rest hand on hip. For posterior oblique projection (forward rotation) has patient grasp side of stand for support with opposite hand. For anterior oblique projection (backward rotation) has opposite hand placed on hip. Rotates body forward or backward as decided so that the median sagittal plane forms an angle of 20° with film,and coronal plane forms an angle of 70° with plane of film, with shoulders in a single transverse plane. For lateral recumbent position, forward rotation, has patient place arm next to film behind back and grasp side of table with opposite hand for support. For backward rotation has arm next to film placed forward at right angles to long axis of body, with elbow flexed and hand under or beside head. Draws opposite arm backward and supports. Rotates body as described above; may apply compression band. Performer directs the central ray at right angles to film centered to the sixth thoracic vertebra.

c. For studies of the lumbar spine including the lumbar-lumbosacral vertebrae, intervertebral foramina, lumbar-lumbosacral apophysial joints, lumbar intervertebral disks, and lumbosacral junction, performer decides whether erect position can be utilized. If not, performer may place footboard into position on tilt-table and position patient with table in upright position; then turns table to the horizontal for final positioning and exposure--if this is more comfortable for patient. For frontal projections, performer chooses the AP or PA projection depending on the patient's condition or specific orders. Performer plans series so that the same basic position, erect, recumbent, supine or prone, is continued throughout, and groups exposures so that a minimum of repositioning between exposures is necessary. For bone-survey, performer makes AP and lateral projections of the lumbar spine.

For frontal projections of the lumbar-lumbosacral vertebrae, performer either centers a single cassette at the level of the iliac crests, or centers one cassette at the third lumbar body at the level of the inferior mid-axillary costal margin, with central ray directed at right angles to film, and centers a second cassette to the lumbosacral joint, and directs central ray cranially or caudally as described below. In centering to the level of the iliac crests performer makes sure not to use visual points of muscle or fatty tissue and palpates for the crest of the bone.

i) For prone or erect PA projection (anterior view) of lumbar-lumbosacral vertebrae, performer has patient stand facing upright cassette holder or lie in prone position on table. Centers the median sagittal plane of body to midline of table or holder. Supports ankles for prone position. Centers film, as described, to level of iliac crests or third lumbar body. Has patient flex both elbows and adjusts arms and forearms symmetrically in comfortable position with shoulders in a single transverse plane. For prone position, has patient rest head on chin to prevent rotation. Directs central ray at right angles through midpoint of film. When two cassettes are used, proceeds for second exposure to positioning for lumbosacral joint as described below (viii).

ii) For supine or erect AP projection (posterior view) of lumbar-lumbosacral vertebrae, performer has patient stand facing away from upright film holder or lie in supine position on table. Centers body and film as described above. Adjusts head and spine to single median sagittal plane, centered to mid-

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line, with shoulders in a single transverse line. Has patient flex elbows and place hands on upper chest. Supports extremity of shorter length for erect patient, or abnormality causing rotation of pelvis for supine patient so as to center symmetrically. Has supine patient flex hips and knees enough to place the back in contact with table. Has patient lean knees together and immobilizes feet. Supports knees where flexion is not possible. Directs central ray as in (i), above.

iii) For lateral projection of lumbar-lumbosacral vertebrae, performer continues patient in erect or recumbent position from frontal projection. Continues with one cassette or two, as described above. For erect patient, centers film as described above and asks patient to turn to lateral position. Centers to midaxillary line of body. Has patient grasp an upright support at shoulder height for support. Has patient stand erect or with pelvis tilted forward and upward, with weight equally distributed. Directs central ray at right angles to midpoint.

For recumbent position has patient turn to affected side and flex hips and knees comfortably. May pad surface to receive hip. Centers midaxillary line of body to midline of table. Adjusts head support to place median sagittal plane of head in line with spine. Has patient flex elbow of affected side and place arm forward at right angles to body. Has patient grasp side of table with opposite hand. Adjusts so that scapulae are in a single vertical plane. Elevates knee on affected side

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to hip level; places sandbag on knee, and has patient superimpose other knee. Supports ankles similarly. Supports lower thorax to place spinal axis parallel with table. Adjusts to correct any rotation of body. Centers one or first of two films as described above. Directs central ray at right angles to midpoint of film. If the spine is not on a horizontal plane, directs central ray at right angles to its long axis through the midpoint.

iv) For oblique semiaxial projection of the last lumbar intervertebral foramina, performer plans on two exposures, turning patient from one lateral recumbent side to the other. For each side, performer has patient assume lateral recumbent position with body aligned so that the coronal plane 1.5 inches posterior to the midaxillary line is centered to the midline of the table. Has patient place the forearm of the side next to the table under head for support and extend upper opposite arm and grasp edge of table above head so that the thorax will be in a lateral position during rotation. Rotates patient's pelvis 30° forward with upper knee flexed and supported. Readjusts so that thorax remains in lateral position. Centers film to the inguinal region of the affected side. Directs central ray angulation so that beam enters at the superior edge of the uppermost iliac crest through the fifth lumbar segment and exits at the inguinal region of the affected side (15° to 30° caudad) . Per-

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former reverses positioning for opposite side.

v) For oblique projections of the lumbar-lumbosacral apophysial joints, performer determines whether centering will be to lumbar region or lumbosacral apophysial joints, or both. Continues basic position used for frontal projections (recumbent, AP or PA). Plans for two exposures, one on each side, for each study.

For PA oblique projection, performer exposes the patient's back and uses wax marking pencil to indicate the spinous process of the third lumbar segment for centering film, and/or marks a point just distal to the spinous process of the fifth lumbar segment for centering last joint. Marks points two inches on either side of centering point for centering spine.

Performer has patient assume semiprone position supported on forearm and flexed knee of elevated side. Supports knee. Centers the plane marked for the elevated side to the midline of table. Adjusts the degree of body rotation to 45° for lumbar region and 30° for the lumbosacral apophysial joint. Centers film to the point as marked. Directs central ray at right angles to midpoint of film. Repeats in reverse position for other side.

For AP oblique projection, starts with supine patient as centered. Has patient rotate body 45° for lumbar region and 30° for lumbosacral facets. Asks patient to place arm on the side next to table comfortably. Has patient

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cross and flex upper hip and knee. Has patient grasp side of table with opposite hand. Supports elevated shoulder, hip and knee. Checks and adjusts body rotation. For lumbar region centers cassette to third lumbar segment; for apophysial joint centers at the level of the transverse plane midway between iliac crests and the anterior superior iliac spines. Directs central ray at right angles to midpoint of film. Repeats in reverse position for other side.

vi) For PA projections (anterior views) of lateral bending positions of lumbar intervertebral disks, performer plans on exposing both left and right lateral bending positions. Has patient stand facing upright cassette holder. Adjusts film height so that it is centered at the level of the third lumbar vertebra, and centers median sagittal plane of body to midline of holder with arms at sides and unsupported. Performer instructs and rehearses patient to lean laterally (right or left, and then reverse for second exposure) as far as possible without support or forcing, and without rotating body or lifting foot. May use restraining band around hips. Directs central ray to midpoint of film at 15° to 20° caudad. Repeats for opposite lateral bending.

vii) For lateral projections of forward and backward bending positions of lumbar intervertebral disks, performer has patient stand in lateral position in front of upright film holder. Centers as for conventional lateral view, and centers film

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height as above to level of the iliac crests. Performer instructs patient to bend forward as much as possible without support and without moving hips for first exposure, and to bend backward as much as possible without support or hip movement for second exposure. May use restraining band. Directs central ray at right angles to center of film.

viii) For semiaxial projection of lumbosacral junction (and sacroiliac joints), performer maintains patient in same position used for frontal projection of the lumbar vertebrae, or starts positioning as described above in (i) PA prone position or (ii) AP supine position.

For semiaxial prone projection, performer maintains patient as in prone position as described for PA projection. Centers cassette to the lumbosacral junction (a point two inches distal to the spinous process of the fifth lumbar segment). For the lumbosacral joint directs the central ray through the joint to midpoint of film at about 35° caudad, entering just distal to spinous process of the fourth lumbar segment. For the sacroiliac joints, directs central ray at right angles, centered at the level of the anterior superior iliac spines, entering about two inches distal to the spinous process of the fifth lumbar segment.

For semiaxial supine projection, performer maintains patient in supine position as described for AP projection, but has patient extend the lower extremities and supports knees. Centers film

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at the level of the transverse plane passing midway between the iliac crests and the anterior superior iliac spines. Performer directs the central ray through the lumbosacral joint at the level of the transverse line used to center the film, at a cranial angle parallel with the lumbosacral angle (about 30° for males and about 35° for females). Adjusts center of film to center of beam if necessary.

For AP flexed supine projection has patient start in supine AP position. Makes sure to drape patient's pubic area. Positions cassette and directs central ray through the lumbosacral junction as described above, before continuing with positioning. Then elevates patient's head and shoulders. Has patient flex hips and knees and draw feet up near hips. Has patient support position with hands under thighs, well up into crease of flexed knees.

For AP lithotomy projection, proceeds as above from AP supine position. Drapes patient and adjusts cassette. Directs central ray through the lumbosacral joint at 15° cephalad. Has patient bring each thigh to a vertical position. Abducts thighs to permit central ray to clear, and supports each foot. May have patient grasp flexed knees for support.

For AP hyperflexed supine projection, has patient positioned as in AP flexed supine projec-

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tion, but adjusts central ray to a 5° angle cephalad. Has patient grasp flexed knees and abduct them widely to clear abdomen,then pull thighs up as close to body as possible.

ix) For localized lateral projection of lumbosacral junction,performer maintains patient in same recumbent or erect position used for lateral projection of lumbar-lumbosacral vertebrae (described in (iii), above), unless otherwise ordered. Aligns coronal plane passing 1.5 inches posterior to midaxillary line to midline of table or cassette holder. For recumbent patient has hips extended as much as possible. Centers film at the level of the transverse plane passing halfway between the iliac crests and the anterior superior iliac spines. Directs central ray at right angles to midpoint of film (or 5° caudad for males and 8° caudad for females if spine is not able to be aligned).

d. For studies of the sacroiliac joints, sacral canal, sacrum, and coccyx, performer considers alternative supine or prone positioning for frontal and oblique views depending on the patient's condition and comfort needs.

i) For anterior oblique projection (posterior oblique view) of the sacroiliac joints, performer has patient assume supine position with head elevated. Elevates the side of interest 25° and supports shoulder, lower thorax, and upper thigh. Aligns body so that the sagittal plane one inch medial to the anterior superior iliac spine of the affected (elevated) side is in line with the midline of the table. Has patient place arm next to table in a comfortable position and grasp side of table with opposite hand. Adjusts shoulders so that they lie in a single transverse plane. Adjusts elevated thigh so that the anterior superior iliac spines lie in the same transverse plane. Supports elevated knee to level of hip. Adjusts and checks degree of rotation. Centers film to the level of the anterior superior iliac spines. Directs central ray at right angles to midpoint of film. If a 20° to 25° central ray cranial angle is called for, adjusts and directs central ray to a point 1.5 inches distal to the level of the anterior superior iliac spines.

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ii) For posterior oblique projection (anterior oblique view) of the sacroiliac joints,performer has patient assume a semiprone position with the affected side next to the table, resting on forearm and flexed knee of elevated, unaffected side. Supports head. Adjusts body rotation as described above, centering to the affected part. Centers film as described above. If a 20° to 25° caudal central ray angle is called for, centers at the level of the transverse plane 1.5 inches distal to the fifth spinous process.

iii) For axial projection of the sacral canal and sacroiliac joints,performer notes whether projections of acute, moderate, and/or slight flexions are ordered,and plans exposure(s) accordingly. Has patient sit at end of table far enough back to center midaxillary

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line of body to transverse axis of cassette holder, centered to the region of the sacral canal or two inches posterior to the greater trochanters. Supports feet on chair or stool. Adjusts body so that median sagittal plane is at right angles to midline. Has patient lean forward from the hips. For acute flexion has patient lean as far forward as possible,with upper arms hanging at right angles to floor alongside legs and chin as close to knees as possible. For moderate flexion has patient flex elbows, hands resting on knees, leaning so that upper arms create an acute angle with table top. For slight flexion has patient place wrists on knees and lean slightly forward so that upper arms are about at right angles with table. Makes sure pelvis is not tilted and that patient is not leaning laterally. Has patient grasp a convenient hand hold such as ankles, legs, side of table, or knees, depending on degree of flexion involved. Directs central ray at right angles to midpoint of film. Repeats for other degrees of flexion if so ordered.

iv) For frontal projection of the sacrum, performer selects supine position (for AP projection) or prone position (for PA projection). Performer aligns patient with midsagittal plane of body at midline of table and legs extended. Supports ankles and/or knees. Compensates for any pelvic rotation. Has patient flex elbows and place arms symmetrically in comfortable position. Adjusts shoulders to lie in a single transverse plane. May use compression band. For supine position directs central ray 15° cephalad, centered to the midpoint of a transverse line halfway between the pubic symphysis and the anterior superior iliac spines. For prone position centers body similarly, with central ray directed 15° caudad, centered to the visible sacral curve (about 3 inches below a line connecting the iliac crests). Centers film to the central ray.

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v) For frontal projection of the coccyx, performer selects supine position (for AP projection) or prone position (for PA projection) and positions patient as described above. Centers film holder under soft tissue depression just above the greater trochanters,between the symphysis pubis and the anterior superior iliac spines or to the central ray. For supine position,directs central ray 10° caudad, centered to a point about 2 inches proximal to the pubic symphysis. For prone patient, performer palpates for coccyx and directs central ray 10° cephalad,centered to the coccyx.

vi) For lateral projection of the sacrum, performer has patient assume a lateral recumbent position on the side of interest with the coronal plane 3 inches posterior to the midaxillary line centered to the midline of the table. Has patient bring arms forward at right angles to body and grasp the side of table with upper hand for support. Has patient flex the hips and knees moderately with lower knee elevated to hip level and support under and between knees and ankles, with knees

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superimposed. Adjusts body so that long axis of spine is on a horizontal plane with no rotation in pelvis. Centers film to the level of the anterior superior iliac spines. Directs central ray at right angles to the midpoint of film.

vii) For lateral projection of the coccyx, performer positions patient as described above, with the palpated coccyx centered over the midline of the table and the film centered to the center of the coccyx. Directs central ray at right angles to the midpoint of the film.

e. For scoliosis series, performer makes two AP projections of the thoracic and lumbar vertebrae, including about one inch of the iliac crests in the field, with patient seated or standing (one normal AP as described earlier and second exposure varied as described below). Performer may also make a normal AP projection of patient standing, an AP projection of patient in supine position (both as described earlier), and two AP supine projections of patient in right and left lateral flexions (as in fusion series described below).

For second AP seated or standing projection, performer notes the convex side of the spinal curve and elevates the hip on the convex side of the curve of seated figure, or elevates foot of standing figure about 3 to 4 inches by placing appropriate object under buttock or foot. Elevates sufficiently for patient to expend some effort in maintaining position, and does not provide support to patient or a compression band during exposure. Directs central ray at right angles to midpoint of film.

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f. For spinal fusion series, performer notes what region is being examined and centers the film to the mid-area of the region, and the central ray at right angles to the midpoint of film. Performer makes two AP supine projections of patient in right and left lateral bending positions and two lateral recumbent projections of the patient in flexion and extension. Performer positions similarly as described earlier except as follows:

i) For maximum lateral bending AP projections in supine right or left bending, performer has patient cross leg on side to be flexed over opposite leg. Performer places one hand against the side of the lumbar region and draws the thighs lateralward (right or left) enough to place affected side's heel near the edge of table. Immobilizes. Draws shoulders directly lateralward as far as possible without rotating patient's pelvis. May apply compression band.

ii) With lateral view of flexion and extension performer centers patient in lateral recumbent position with coronal plane about 2 inches posterior to midaxillary line at midline of table. For flexion has patient lean forward and draw thighs up as much as possible. For extension has patient lean backward and extend hips and thighs as much as possible. May use compression band.

g. If, during positioning, patient shows signs of severe pain, performer may notify appropriate physician at once and await orders, or may decide on alternative po-

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sitioning to avoid movement of the affected part.

   h. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size (or the size of the unshielded area of the film to be exposed). Uses cross-hair shadows as reference for center of field. Uses the collimator light to center the patient to the x-ray field, or centers the part to the film holder and uses the collimator light to center the tube to the part. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired. May readjust tube position lengthwise or crosswise to provide better centering.

14. Once the patient has been positioned and immobilized, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). For small fields performer attaches an auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the part(s) of interest.

15. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that proper protective shielding has been provided to patient and everyone who will remain in room.

16. Throughout procedure performer observes patient for any signs of emergency and/or to prevent or respond to an accident. Is alert to signs of nausea, dizziness, or sweat suggesting faintness. Performer may have patient lie down, lower head, or raise legs. Notifies nurse. If patient shows any other emergency signs, loses consciousness, or has an accident, performer calls appropriate physician or nurse at once. May decide to provide emergency first aid as well. If a patient's catheter becomes disconnected, performer clamps it and immediately notifies nurse. If catheter should come out, notifies nurse at once.

17. When everything is ready for the exposure, performer explains to patient what breath control will be used for exposure; explains that taking breath, breathing out and/or holding still, or phonating as rehearsed should be maintained until patient is told to relax by performer. Reminds patient about those exposures in which position is to be retained for a second exposure. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

    a. For projections of cervical spine, occipitocervical articulations, atlas, axis, odontoid processes, and intervertebral foramina, performer has patient hold breath during exposure except as follows:
       i) For conventional AP projection of cervical column, has patient open and close mouth during exposure, moving the mandible smoothly and fairly rapidly without striking the teeth together, as rehearsed. Has patient start just before exposure and continue until exposure is terminated.
       ii) For lateral projection of cervical spine has patient breathe out and hold.

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iii) For AP open-mouth projection of the atlas and axis, performer has patient keep mouth wide open and softly phonate the sound "ah" during the exposure as rehearsed.

iv) For AP projection of lower cervical vertebrae and oblique AP or PA projection of cervical intervertebral foramina, has patient softly phonate the sound "mmm" during the exposure as rehearsed.

b. For projections of the cervical and upper thoracic vertebrae, thoracic spine, lumbar spine, sacrum, coccyx, and sacroiliac joints, has the patient breathe out before the exposure and hold breath during the exposure except as follows:

i) For views of cervical and upper thoracic vertebrae, the lumbosacral junction, lumbar intervertebral foramina, sacroiliac joints, sacrum, and coccyx, performer may have patient merely hold breath or hold still during exposure if so ordered.

ii) For lateral view of thoracic vertebrae, performer may have patient breathe quietly with shallow breaths if so ordered.

c. For scoliosis and spinal fusion series performer has patient hold breath during exposures.

18. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to hold breath and/or hold still by calling or using intercom. Performer initiates exposure by pressing hand trigger or exposure control button.

a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.

b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction, may decide to report; anticipates need to repeat exposure.

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c. With phototimer notes whether backup timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure (due to underexposure if premature cut-off, or overexposure due to faulty timer).

d. After exposure is completed tells patient that he or she can relax.

e. If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

19. Performer returns to patient. Removes cassette or film holder from table, floor, or bucky.

a. Removes any markers for further use. If multiple views are to be taken on the film, removes leaded rubber mask and remasks all but next area to be exposed.

b. If the patient is accident victim or if so requested, performer arranges to have the first exposure(s) processed at once and brought to the appropriate radiologist.

c. If the first radiograph(s) are preliminary (scout) films, performer brings the processed radiograph(s) directly to the radiologist in charge or places on view boxes and informs radiologist that the scout (s) are ready. If the radiologist indicates that there is any problem with the technical factors or the patient positioning, performer records or notes for later use in

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the examination and/or repeats preliminary radiography as ordered.

d. Depending on whether radiologist will evaluate radiographs before completion of all possible exposures for the series, performer arranges to process film(s) and evaluate for quality control personally, have this done, or bring to darkroom for processing and later evaluation, based on time available, institutional arrangements, or specific instructions. Attaches ID card for use with flasher if appropriate. May sign requisition.

e. While films are being processed and/or evaluated performer has patient relax in examination room or holding area. Explains what will happen next.
   - i) Performer determines whether patient should remain on table and/or in room or requires observation. May consult requisition sheet or attending RN. If appropriate, makes sure that patient will be attended while waiting.
   - ii) If appropriate, moves x-ray tube and any protruding film holder away from patient before patient rises.
   - iii) May decide to assist patient to chair or stretcher or from table. Makes sure patient is reminded of any footrest in stepping off table.

20. When (or if) performer learns from the radiologist the extent of the injury and/or whether further conventional views and/or positions can be undertaken, eliminated or altered, performer proceeds as appropriate according to instructions.

a. For further exposures performer repeats appropriate steps for next view(s) including identification of

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film holder or cassette and use of R-L marker, selection and setting of technique for next view (if different), positioning patient and equipment for focus-object-film alignment, proper collimation and shielding, breathing instructions, and making exposure, as described above.

b. Performer refrains from commenting on the films or providing any interpretation.

c. If performer is asked to repeat any exposures, makes sure that the additional exposures are warranted medically, since additional radiation will be incurred.
   - i) Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."
   - ii) If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member.
   - iii) If request for retakes reflects the preference for density or contrast of a radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.

21. When performer is sure that the examination has been completed, performer may have patient transported back to holding area or next location, or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient as described above.

22. Performer carries out termination steps for the examination:

a. Performer has equipment and examination table cleaned after use

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or decides to do personally, depending on institutional arrangements. b. Performer records the examination according to institutional procedures. May include date, room, examination type, the views taken, the technical factors used and film sizes; may record the number of exposures made of each view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. If any views called for in the initial request could not be obtained, performer may record reasons. Signs requisition sheet. c. If performer will only carry out preliminary "scout" filming and another technologist will continue with examination, performer records the approved technical factors used for the scouts, and the accessories employed, or informs technologist who will continue. Performer gives the requisition sheet, name card, and any notes to technologist who will continue with procedure. d. Performer may decide to jacket films, requisition sheets, and related materials and/or have information recorded in log book personally or have this done, depending on institutional procedures. e. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

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1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured,positioned;parts measured;films identified;technical factors selected and set;technique for magnification set up;barium administered;exposures made;radiographs sent for processing and evaluation;procedures repeated as appropriate for full set of views;patient returned; examination recorded;radiographs placed for use.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, technical history;pen;x-ray machine control panel(s),tube,bucky,table,collimator,extension cones; technique chart;charts for conversion of technique, tube angulation,views for standard examinations,dosage,tube capacity;loaded cassettes;vertical film holder;leaded rubber shielding;R-L and ID markers;immobilization and support devices;stool;calipers;tape; bandage;scissors;protractor;compression band,head clamp;stretcher or wheelchair;marking pen;barium sulfate paste

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-infant patient to be radiographed; radiologic technologist; radiologist; nurse

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Taking plain film radiographs of sternum,ribs and/or thoracic viscera of non-infant patient by reviewing request;reporting observed contraindications;reassuring pt.;measuring part;setting up for magnification technique;selecting and setting technical factors; identifying film;positioning pt. and equipment for erect or recumbent exposure;providing shielding;collimating;administering barium for heart series;making exposures;having radiographs processed and reviewed; repeating for full set of views or as ordered;having pt. returned;placing radiographs for use;recording examination.

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Performer receives or obtains the x-ray requisition form,patient identification card, and any appropriate medical-technical history for a non-infant patient scheduled for radiography of the sternum, ribs, and/or thoracic viscera (trachea, lungs, esophagus, heart and/or great blood vessels):

a. After checking assignment on schedule sheet.
b. From co-worker.
c. After having arranged requisitions in order of priority.

The plain films of the chest may be part of a bone or abdominal survey. Those of the thoracic viscera may serve as preliminary "scout" films for contrast studies such as bronchography; the plain films of the heart may be for a cardiac series involving swallowing of a barium sulfate paste. Plain films may also serve to study air or fluid levels, foreign body localization, diaphragm excursion.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided.

   a. Performer checks the examinations called for including the affected side and parts, the purpose of the study, the positions and views called for,

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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breathing instructions, the number of exposures, body angulation, whether bilateral or unilateral studies are requested, the central beam angulation, the areas of interest and parts to be included, whether known or suspected unhealed fractures or destructive disease are involved, and the sites. Notes whether the use of a grid or bucky will be involved. Notes any request for magnification. Checks the name of the referring physician.

b. Performer reads patient's name, identification number, sex, age, height, weight. Notes whether patient is inpatient, out-patient, or emergency patient. Notes any special information that will affect patient positioning, technique, or handling of the patient, presence of plaster cast, taping, extremities of unequal length, whether patient will be on a stretcher or wheelchair, and any notation on the nature of any known pathology which would affect technique. For cardiac series makes sure that information on patient's weight and height is available.

c. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter or similar device in place; notes whether patient will be accompanied by nurse or other staff person.

d. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved. Goes to examination room or control room for machine involved.

e. If magnification has been requested, performer checks that the machine to be used has a fractional focal spot of appropriate size for direct magnification technique (i.e. 0.3 mm or smaller).

f. If the study ordered will involve use of x-ray tube in direct contact with the patient's back, performer makes sure that the system in room is shock-proof.

g. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete. Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

h. Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether number of radiographic exposures involved should be reported to radiologist.

i. Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.

j. If patient's record indicates orders for sedation or any other prior medication performer may check timing to be sure a proper elapse of time has occurred for medication to take effect. May arrange to delay examination if appropriate. Notes shielding needed.

k. If referring physician has requested that films already on file be sent with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

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2. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer notifies supervisor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate and proceeds after obtaining needed information,signature, or orders.

3. When performer is clear about what will be involved in examination, he or she prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Performer reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).
   b. Performer washes hands as appropriate; depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
   c. Performer makes sure that x-ray equipment is ready for use.
      i) For automatic chest x-ray equipment performer makes sure that a sufficient number of unexposed films are in the loading magazine and that receiving magazine is ready to receive exposed films.
      ii) Performer may set up equipment as appropriate for stereographic projections (involving two films with overlapping exposures for specified positions) if ordered.

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      iii) Goes to control panel for x-ray generator and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for machine to "warm up." If appropriate,performer may set radiography mode selector and set collimator control for manual operation.
   d. If a cardiac series has been ordered, performer checks that a thick barium sulfate mixture has been prepared for patient to swallow,or arranges to have prepared personally or by staff member.
   e. Performer checks that appropriate immobilization devices such as sandbags, wedge sponges,gauze bandage, compression band, support stand, tape are present, and that there is a mattress, pads, pillows and/or blankets for comfort of patient if patient will lie on table. If appropriate, obtains protractor. May set up footboard at end of tilt-table.
   f. Checks that there is leaded rubber shielding available in room to be used to mask film, protect the patient, and/or to place beneath the film holder, as appropriate.
   g. Performer prepares for identification of the films using equipment provided by institution:
      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write

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or type out ID information on card if not received with requisition.

- iii) Checks identification against requisition sheet.
- iv) Performer makes sure that right (R) and left (L) markers are available for use.

4. If magnification has been requested, performer prepares the equipment for the tube-over-table method of magnification (used without bucky):

   a. Performer determines the degree of magnification requested on the requisition sheet; if the request is expressed as an area magnification performer determines the linear magnification by taking the square root. (Linear magnification squared equals area magnification.)

   b. Performer calculates the required distances from target (focal spot) to object (patient) (TOD), and from object to film (OFD), as well as the distance from target to film (TFD) (the sum of TOD and OFD):
      - i) If the distance from the table top to a cassette placed on the floor or a stool (OFD) will be a relatively inflexible distance, performer measures this distance or reads indicator scale. (If stool is to be used, may note the table height.) Performer may adjust table height to provide for a round number for the OFD.
      - ii) If the distance from the focal spot to the table top (TOD) will be the relatively inflexible distance, performer determines what this is by measuring or reading appropriate indicator scale on tube housing. Performer may adjust tube height to provide a round number for the TOD.
      - iii) Depending on whether the OFD or the TOD is fixed, performer calculates the required complementary distance by referring to a magnification chart for the degree of linear magnification required, or uses the formula: degree of linear magnification equals TFD divided by TOD. For a two-times linear magnification performer simply sets the TOD equal to the OFD.
      - iv) Performer adjusts and locks the table height and/or the tube height to the calculated OFD and TOD.

   c. Performer aligns the object-film and target-object distances:
      - i) Performer moves the x-ray tube housing until it is centered over the table top in the approximate area where the patient's area of interest will be positioned, such as on table.
      - ii) Performer swings the table out of the way so that there is no obstruction between the tube and the floor. (Does not change height.) If appropriate, places a stool on the floor under the tube. May place cassette of appropriate size on floor or stool. Performer selects the size film designated for the degree of magnification and the selected part to be studied.
      - iii) Performer adjusts the collimation to correspond to the field size anticipated (for the TOD involved).
      - iv) Performer activates the light in the collimator and adjusts the tube horizontally so that the light beam case is centered to the cassette on the stool or floor. Uses the cross-hairs projected by the beam to center the tube to the area on the floor or stool.

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v) Performer locks the tube into position so that there is a 90° angle of the beam with the floor or stool. Fixes and retains collimator setting.

vi) Performer marks the outline of the collimated light area or cassette on the floor or stool using tape or other removable marker. If not already done, checks by placing cassette in marked area. May mark center of area as shown by cross-hairs.

vii) Performer swings table back into place. Activates light beam in collimator and marks the table top where the center cross-hairs and light outline are projected (to be used to center the part to be radiographed). Uses tape or other radiolucent removable marker.

viii) Performer may recheck TOD and OFD to be sure that they correspond to the calculated distances.

d. For magnification technique using a vertical film holder, performer may wait until patient has been brought into examination room. Adjusts upright holder to appropriate height; adjusts x-ray tube to right angle projection of beam to film holder; centers to the film; measures and adjusts TOD to patient's position and marks patient's position; measures and adjusts OFD from patient's position as marked.

e. If the sum of the new TOD and OFD (TFD) is now different from the TFD used for non-magnification technique, performer may consult technique chart to note the factor to use for a compensatory change in mAs. May record for later use in setting exposure factors.

f. Performer may also note the change in kVp and mAs necessary to compensate for any change in collimation from non-magnification technique. Consults appropriate charts for conversion factors. May record.

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5. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

   a. Depending on institutional arrangements performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

   b. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

   c. Has patient assume a comfortable position seated on table or chair. If patient is in wheelchair, moves patient in chair into position next to table. If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move patient to table. With accident patient uses upright film holder with patient remaining on stretcher until injury has been localized.

   d. Performer explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

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e. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains when asked medical questions that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

f. If patient has an IV drip in place, performer checks that needle has not become dislodged and that the fluid is dripping at an even rate. If there are any problems, performer clamps tube and notifies an appropriate staff person at once.

g. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs appropriate physician and proceeds only with approval.

6. Performer questions patient and/or RN or MD present on what movement is possible to determine what positions are available for use. Considers whether to have patient erect (seated or standing) or recumbent, or considers orders in light of the patient's condition.

a. For accident victim or one with recent rib injuries, performer plans for examination of patient in position in which he or she arrives (supine or prone on stretcher, erect in wheelchair; or erect if ambulatory) without moving patient; and plans for PA or AP and left lateral projections of the chest. Does not proceed with additional radiography until site and extent of injury is determined, and acceptable positioning specified by MD.

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b. If a cardiac patient is involved, performer selects supine position unless otherwise indicated.

c. If the examination is to routinely study the heart or lungs, performer selects erect positions unless otherwise indicated.

d. If studies of the ribs are ordered performer selects erect positions for ribs above the diaphragm and recumbent positions for ribs below the diaphragm unless otherwise indicated.

e. Performer notes the patient's body type, whether the area of interest is heavily covered by muscle or soft fat, whether the palpation points will be easy to find. Notes whether the extremities are of unequal length. For female patients, performer judges whether the breasts are large and pendulous. If so, may have patient or staff member draw the breasts to the sides and hold in place with wide bandage or by having erect patient lean breasts against erect cassette holder.

f. For oblique projections performer substitutes right PA oblique projection for left AP oblique projection and/or left PA oblique projection for right AP oblique projection as appropriate to the patient's condition.

g. Performer considers the number and types of projections ordered for the examination and the patient's condition. Performer may consider a change from standard projections to better accomplish the purpose of the examination, or deletion of a position or a change in technical factors. Depending on institutional arrangements, performer may obtain permission from appropriate radiolo-

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gist or decides personally to alter the standard procedure.

7. Performer prepares for the examination:
   a. If not already done, has patient's clothing removed to the waist and provides gown or drape. May assist patient or request assistance from nurse if there is a fracture involved. Keeps body covered until ready for positioning and radiography. Reveals only as much of body as necessary. Treats young patient with as much courtesy as adult.
   b. If patient has adhesive strapping in place, performer notes whether it is old and wrinkled and requires removal before radiography. If so, performer indicates this to appropriate staff member and waits for removal and restrapping by RN or MD.
   c. Depending on whether a bucky, table top,or automatic chest x-ray technique will be used and standard institutional practices, performer selects speed and type of film,grid and cassette combination:
      i) Selects size(s) based on the area(s) to be included, the patient's size, and whether bilateral views are to be exposed on a single film.
      ii) For magnification technique performer selects the size film designated for the degree of magnification and the selected part to be studied.
      iii) Performer makes sure that an adequate supply of films in magazine or loaded cassettes of the types and sizes selected are available in the examination room. If not, arranges to obtain or decides to obtain personally.
   d. Performer obtains the appropriate size loaded cassette for the first projection (unless automatic chest x-ray equipment is to be used). If bilateral exposures will be made on one film, performer mentally decides how these will be positioned so that the film need not be turned for viewing each image. Performer uses leaded rubber sheets,and masks the cassette completely except for the area to be exposed. Treats the area to be exposed from this point as though it were the actual film size.
   e. Performer attaches identification information to the cassette, table top, or chest x-ray equipment:
      i) Places right or left marker on film holder or table top as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.
      ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of cassette.
      iii) If patient identification information is to be entered by use of flasher, sets flashcard aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.
      iv) Performer may place patient's card into card slot or tray for chest x-ray equipment using automatic film marking device.
   f. If appropriate to make possible minimal movement of patient,performer may place cassette in upright holder at right angles to table top or in other position selected.
   g. If automatic chest x-ray equipment is being used, performer has patient sit or stand in front of

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film holder and adjusts height of holder to patient.

h. If cassette is to be used with bucky (under tabletop or in upright holder) performer may manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.

i. If a bucky or chest x-ray equipment is not being used, performer places cassette in a position that can be comfortably reached by the patient in final positioning.

j. If magnification technique is to be used, performer places cassette in marked position on floor or stool.

k. With accident patient, after localization has been established, performer may obtain assistance in lifting patient so that cassette can be placed under patient.

l. Performer provides patient and everyone who will remain in room during exposure with protective shielding. Explains it necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

8. Performer has patient assume a comfortable recumbent,standing, or seated position,depending on the positions to be employed, so that the part(s) to be radiographed can be measured. Makes sure that wheelchair is in locked position if patient is to be positioned in it.

a. If appropriate, places mattress, pillow or clean linen on x-ray table. May place pillows behind patient in wheelchair to support upright cassette.

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b. Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way and may be collided with by patient.

c. If assisting patient to step on footstool in order to get on table, helps patient turn into position,step backwards on stool, and then sit and/or lie on table.

d. Performer uses centimeter calipers to measure the thickness of the part(s) to be radiographed in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors.

e. If patient has a urinary catheter in place, performer turns patient toward the catheter and tubing to prevent separating it from drainage bottle and breaking sterile system and to avoid causing pain.

f. After measuring, has patient rest in as relaxed a position as possible. May place pad, blanket or pillow under bony prominences to provide comfort for recumbent patient.

9. Performer selects the exposure factors for the first projection by consulting the technique chart(s) posted for the machine:

a. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other accessories (such as screens, grids, bucky, etc.).

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b. Makes note of the kVp,mA,T(seconds of exposure time), focal spot size, and the focal film distance (TFD or FFD) called for.

c. Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for a pathological condition, a cast, change in TFD, extreme fat or muscularity, preference of the radiologist involved, and any other conversion needed such as with magnification technique. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate.

d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

10. Performer sets exposure factors as selected:

a. Enters control room. Makes sure that indicator light shows that x-ray generator is ready for use. Makes sure that all circuits have been stabilized.

b. If appropriate,checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.

c. For conventional exposure control:

i) Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.

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ii) Performer selects and sets the exposure time that will produce the mAs desired.

iii) Performer sets the kVp selected by choosing the combination of major and minor kilovoltage settings for the desired kVp.

d. For automatic phototimed exposure control:

i) Performer selects and sets the category corresponding to the type of study and use or nonuse of screens,bucky,etc.,and if appropriate,focal spot size.

ii) Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).

iii) May select and set a kVp range button (if called for with equipment) corresponding to range for examination.

iv) Sets a density selector corresponding to the usual (or special) requirements for study.

v) Makes sure backup timer is not likely to terminate exposure prematurely.

e. Depending on the equipment,may set controls to provide for use of bucky, manual tableside adjustment of table and tube height, position, and of collimation.

f. Performer returns to overhead unit and sets the focal-film distance. Operates controls or manually moves the x-ray tube into place over the film holder (or at right angles to upright holder). Checks the focal-film distance by reading indicator scale in the tube housing;adjusts up or down until the required FFD (TFD) is obtained.

11. Performer plans to place the part to be radiographed in the final position selected for the first exposure:

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a. With accident patient, if the affected area of the ribs has not been localized, performer first plans to make a preliminary film for identification of the extent of the suspected trauma or pathology. When the lesion has been localized by the MD, performer makes the exposures then ordered so that the affected rib region is parallel with the plane of the film. Performer selects projection from above or below diaphragm as appropriate.

b. For bone,chest or abdominal survey, plans for PA and left lateral projections of the chest, with exposure factors geared for bone details of ribs and sternum or for thoracic viscera, as appropriate.

c. If a cardiac series (including esophagus) has been requested, performer plans to administer barium paste "swallow," and makes PA and lateral projections and an oblique projection from each side.

d. If a foreign body search or diaphragm study is ordered or a pneumothorax is suspected, performer plans two exposures for a given position, one on inhalation and one on exhalation. For diaphragm excursion plans both exposures for the same film.

e. If recumbent positions are specified for an ambulatory accident patient, performer uses footboard set up at end of table; positions patient on tilt-table in the vertical position and adjusts table to the horizontal for final adjustments and actual exposure.

f. If patient will be standing and limbs are of unequal length, performer provides support to shorter limb so as to evenly distribute weight.

g. Performer centers part and keeps the long axis of the part parallel to

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the film holder. May explain or demonstrate to patient what is required. May obtain help in positioning. When using a bucky centers patient to midline. With cassette on table top, centers film to part. With upright holder adjusts height of holder to part and centers part to film.

12. Performer positions as follows (unless nonconventional positioning is being used to avoid having patient move):

a. For studies of the sternum and the sternoclavicular articulations, performer notes whether suspended breathing after exhalation or rapid shallow breathing will be used during exposure for oblique and lateromedial projections of sternum. Notes whether body rotation or central ray angulation methods are to be used in lateromedial projection of sternum, and unilateral oblique projections of sternoclavicular articulations. Notes whether projections of the sternoclavicular articulations will use direct contact of tube to part. For sternoclavicular articulations notes whether unilateral or bilateral studies are ordered.

1) For right posterior oblique projection (right anterior oblique view) of the sternum, has patient first assume prone position; then adjusts patient to a PA oblique position with right side nearer to table and patient supported on flexed upper knee and forearm. Aligns body so that the long axis of the sternum is centered to the midline of table. Performer rotates thorax by elevating

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shoulder and hip. Places a hand on patient's sternum and other hand on the thoracic vertebrae just above, and adjusts rotation so that vertebrae are not superimposed on sternum. Centers film to the midsternal area. Applies compression band around thorax if light breathing will be utilized. Supports flexed knee. Directs central ray at right angles to midpoint of film.

ii) For lateral projection of sternum, performer selects erect seated or standing position or lateral recumbent or supine position. Has female patient's breasts drawn to the sides as described above. Centers sternum to midline of table or film holder and film to the midsternal area. Includes the manubrial notch and distal tip of xiphoid process in view unless otherwise specified. For supine position adjusts patient if possible in AP position and employs vertical film holder and cross-table projection of ray. For lateral recumbent position, centers long axis of sternum to midline of table. Has patient flex hips and knees in comfortable position, and supports lower knee and ankle. Has patient extend arms upwards with head on arm next to table, and upper hand grasping side of table for support. Supports lower thoracic region so that long axis of sternum is horizontal. For erect position has patient sit or stand erect in a lateral position before upright cassette holder and adjusts height to center film. Has patient distribute weight evenly on both feet or buttocks, with head erect and facing directly forward. Rotates shoulders backward; may have patient lock hands or fold arms behind back. Has cassette holder close enough for patient to rest shoulder against it, keeping median sagittal plane of body vertical.

For all positions adjusts rotation of body so that broad surface of sternum is at right angles to plane of film. Directs central ray at right angles to center of film.

iii) For tube angulation method of lateromedial projection of the sternum, performer obtains chart giving degrees of x-ray tube angulation for measured depths of thorax(after compression). Performer adjusts patient in prone position, with median sagittal plane of body centered to midline of film holder. Centers film so that manubrial notch is about two inches below upper border of film and long axis of sternum is centered to midline. Has patient face tube and rest head on cheek. Applies compression band if so ordered. Performer uses calipers to measure the depth of the thorax in the median plane at the level of the sternal angle (about the level of the spinal process of the fifth or sixth thoracic vertebra). Records. Checks angulation on chart based on the measured thickness. Records. Directs central ray from the left to the midpoint of film at the tube angle found on chart.

iv) For PA projection (anterior view) of sternoclavicular articulations, performer notes whether a bilateral or unilat-

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eral examination is ordered, and whether shock-proof equipment will be used in direct contact with patient (prone or erect). Has patient assume supine, prone, seated, or standing position as decided and adjusts patient in symmetrical alignment centered to midline of table, with weight evenly distributed for erect patient, and with shoulders in a single transverse plane. Centers film to the manubrial notch at the level of the spinous process of the third thoracic vertebra. Has arms at patient's sides, facing upwards for prone patient.

For bilateral examination has patient's head rest on chin (if prone), or facing straight ahead (if supine or erect), so that median sagittal plane is at right angles to film. For unilateral examination has patient turn head to face the side of interest, resting on cheek if prone.

With direct contact exposure, centers tube carefully and brings into direct contact with the midpoint of patient's back at right angles to film. For supine patients adjusts tube from under patient, and film holder above patient. For non-direct contact exposure, centers tube at right angles to midpoint of film.

v) For oblique or lateromedial projections of the sternoclavicular articulations, performer notes whether a bilateral or unilateral examination is ordered, whether shock-proof equipment will be used (in direct contact with patient), whether body rotation or central ray angulation will be utilized, and whether patient

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will be prone (usually) or seated erect.

For unilateral oblique projection using body rotation, performer places patient in prone or seated erect position. Then turns patient obliquely with side of interest facing film. Adjusts cassette holder so that the sternoclavicular joint is at center of film, with body angled so that vertebrae shadow will be projected behind the joint when the ray enters at right angles. Adjusts shoulders to lie in a single transverse plane. Directs central ray at right angles to midpoint of film.

For unilateral oblique projection using central ray angulation, places patient in prone or erect PA position as described above, with film centered to the sternoclavicular joint of interest, and arms, shoulders, and head adjusted in PA position as described above. Adjusts x-ray tube so that the ray will enter on the side of the joint of interest at an angle of 15° toward the median sagittal plane of the body.

For bilateral lateromedial projections, adjusts patient to prone or erect seated PA position as described above. Centers film to manubrial notch and adjusts head as for PA filming as described. Locates spinous process of the third thoracic vertebra, and marks a point 6 cm. on either side for centering ray. Either uses film masked appropriately for

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filming both sides on the same film (without moving patient),or shifts cassette appropriately. Performer adjusts x-ray tube angulation for given focal-film distance or in direct contact with patient's body as decided. Centers ray to one side for first exposure and to other side for second exposure at 5° or 15° as ordered, toward the median sagittal plane, centered to the point previously marked for that side. Reminds patient to hold position for second exposure.

vi) For lateral projection of sternoclavicular articulations,has patient assume a lateral recumbent or erect position as described above, with sternoclavicular region centered to midline of table or film holder, with recumbent hips and knees flexed and supported as described. Has recumbent patient fully extend arm next to table and grasp end of table. Has patient depress shoulder on opposite side grasping the dorsal surface of hip. Adjusts thorax so that anterior surface of manubrium is at right angles to plane of film. Directs central ray through the lowermost sternoclavicular articulation at 15° caudad.

b. For studies of the ribs and costal joints, performer considers whether a preliminary film of upper and/or lower ribs are to be radiographed and the erect or recumbent position selected. Notes whether a wide angle, bilateral (two cassette) study is required. Decides whether bilateral study of costal joints can be projected with a single exposure or requires two separate exposures.

i) For PA projection (anterior view) of anterior ribs, performer adjusts patient in prone or

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erect position. Has erect patient seated or standing with back to vertical cassette holder, with weight evenly distributed and shorter limb supported if required. Centers erect or prone patient so that median sagittal plane of body is at midline of table or holder. Has patient rest hands against hips with palms turned outward. Adjusts shoulders to lie in a single transverse plane. With erect patient has shoulders placed in contact with film holder. Rests patient's head on chin (if prone) or facing directly ahead,so that median sagittal plane is at right angles to film. Centers film so that upper border is about 1.5 inches above shoulders, centered at the level of the sixth thoracic vertebra. For upper ribs,directs central ray at right angles to midpoint of film. For lower ribs,directs central ray at right angles about 5 inches proximal to the midpoint of film.

ii) For AP projection (posterior view) of posterior ribs, performer adjusts patient in supine or erect position. Positions as for PA projection,as described above, but with patient facing cassette holder rather than facing away. Rotates shoulders forward. For ribs above diaphragm, may have patient place hands over head. Centers film to level of sixth thoracic vertebra with 1.5 inches of upper border extending above shoulders. Directs central ray at right angles, centered 4 or 5 inches above the midpoint of the film.

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For ribs below the diaphragm, may have patient fold hands over chest. Centers film to level of twelfth thoracic vertebra and lower border about 1.5 inches below the crests of the ilia. Directs central ray at right angles 4 or 5 inches below the midpoint of the film.

iii) For posterior oblique projection (anterior oblique view) of axillary portion of ribs, performer starts from PA position as described above, with film centered at the level of the sixth thoracic vertebra for ribs above diaphragm and at the level of the twelfth thoracic vertebra for ribs below the diaphragm (or midway between for scout film). Rotates body about 45° with the side of interest away from film. Has recumbent patient rest on forearm and flexed knee of elevated side and supports. Aligns body so that a longitudinal plane midway between the median sagittal plane and the lateral surface of body is centered to midline of holder. For upper ribs directs central ray at right angles to film 4 to 5 inches above midpoint; for lower ribs directs central ray at right angles to film 4 to 5 inches below midpoint.

iv) For anterior oblique projection (posterior oblique view) of axillary portion of ribs, performer starts from AP position as described above, with film centered as in (iii), above. Rotates body about 45° with side of interest towards the film. Supports elevated hip of recumbent patient. Has patient abduct arm of side of interest and elevate, and has erect patient rest hand on head; has recumbent patient place hand

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under or above head. Directs central ray as in (iii), above.

v) For a wide angle, bilateral frontal projection of ribs, performer arranges two cassettes at right angles to each other, facing inward, so that each is at a 45° angle to the central ray. Positions patient in AP or PA position opposite and centered to the apex of a triangle formed, with patient's body constituting the base of the triangle. Adjusts height of cassettes to center to the level of the area of interest. Directs central ray at right angles to the apex of the triangle (where the two cassettes meet), so that both films are exposed at once.

vi) For semiaxial AP projection (posterior view) of the costal joints, performer positions patient in supine AP position as described above, with arms over head or along sides, depending on the need to adjust spine in contact with table top. May apply compression band across thorax. If a bilateral projection can be accomplished with one exposure, performer centers film to central ray and directs central ray through the sixth thoracic vertebra at an angle about 20° cephalad, depending on the degree of dorsal kyphosis. If a bilateral study requires two separate exposures, performer rotates body 10° medially in one direction for first exposure and 10° medially in the other direction for the second exposure.

c. For studies of the trachea, superior mediastinum and pulmonary apices, performer reviews basic position selected, specific breath-

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ing options, and whether angle block will be used for lateral projection.

i) For AP projection (posterior view) of trachea, performer has patient assume seated, standing or supine position. Centers the median sagittal plane of body to midline of table or cassette holder. Has erect patient distribute weight evenly. Adjusts shoulders to lie in a single transverse plane. Extends head slightly and adjusts so that median sagittal plane is at right angles to film. Immobilizes head with clamp or weighted band. Centers film at the level of the manubrium. Directs central ray at right angles to the film centered to the manubrium.

ii) For lateral, retrosternal projection of trachea and superior mediastinum, has patient sit or stand erect in a lateral position before vertical cassette holder with weight equally distributed. Centers cassette holder so that upper border is at or above the level of the laryngeal prominence, with coronal plane midway between the manubrial notch and the midaxillary line, centered to the midline. Rotates shoulders backward and has patient clasp hands behind body or place hands on hips, with thumbs up, and hold shoulders back. Extends head slightly. Makes sure that the median sagittal plane of the body is parallel with film. Directs central ray at right angles to film centered to a point midway between the manubrial notch and the anterior border of the head of the humerus. For demonstrating entire chest, centers 4 to 5 inches lower.

iii) For lateral, trans-shoulder projection of trachea and pulmonary

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apex, performer positions patient seated or standing erect in a lateral position before vertical cassette holder, with the affected side next to the film. Has patient elevate arm next to film in extreme abduction, with elbow flexed and forearm across head. Centers film as described above, to the level of the axilla. Has patient rest shoulder next to film against holder and depress opposite shoulder as much as possible. Directs central ray through the adjacent supraclavicular fossa at 15° caudad.

iv) For AP projection (posterior view) of pulmonary apices, performer has patient sit or stand in AP position before vertical cassette holder or lie in AP supine position. May elevate shoulders of supine patient on angle block. Aligns body for true AP position. Centers film to the median sagittal plane at the level of the second thoracic vertebra. Has patient flex elbows and place hands on hips with palms out or pronate hands beside hips. Rotates shoulders forward and in a single transverse plane. Directs central ray to second thoracic vertebra at 15° to 20° cephalad. If shoulders are raised on angle block, directs central ray at right angles to film, centered to lower neck.

v) For PA projection (anterior view) of pulmonary apices, performer has patient sit or stand in PA position before vertical cassette holder, with weight equally distributed. Centers cassette to the level

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of the manubrial notch, with median sagittal plane of body centered to midline. Extends chin over top of cassette with median sagittal plane of head at right angles to film. Has patient flex elbows, place hands on hips with palms out. Depresses shoulders and rotates forward in a single transverse plane. Has patient keep shoulders in position and in contact with cassette. For exposure to be made on inhalation, directs central ray to the third thoracic vertebra at 10° to 15° cephalad. For exposure to be made on exhalation, directs central ray at right angles to film, centered at the level of the third thoracic vertebra.

d. For studies of the chest, including lungs and heart, performer notes whether lungs or heart are of prime interest in order to select centering for central ray. Makes sure barium is ready for heart series. Notes which is the affected side for lateral studies and on which side patient is to lie. With suspected foreign body, pneumothorax, or diaphragm study, has patient breathe in and hold for first exposure; has patient hold position; replaces film; and has patient breathe out and hold for second exposure. Performer makes both exposures on one film to study excursion of diaphragm. May make PA chest projection as part of an abdominal series.

i) For PA projection (anterior view) of lungs and heart, performer has patient assume an erect, standing or seated position if possible, or prone position, facing cassette. Adjusts cassette so that upper border of film is about 1.5 inches above shoulders, with median sagittal plane of body at midline of film. Has arms at sides. For erect patient has weight distributed equally. Has prone patient rest head on chin; has erect patient extend chin over top of cassette; adjusts head so that median sagittal plane is at right angles to film. Has female patient's breasts held to the sides as described earlier. Has patient rotate and depress shoulders forward, flex elbows, and place back of hands well down on hips. Adjusts shoulders to a single transverse plane with clavicles below the apices. Has patient keep shoulders in contact with cassette or table top. May have unsteady patient place arms around upright cassette. Makes sure that there is no rotation of body. If exposures are to be made both at inhalation and exhalation, instructs patient to maintain position for second exposure. If stereoscopic projections are to be made, plans to shift tube (or have this done automatically) on one respiratory movement. For lungs, directs central ray to the median sagittal plane at the level of the fourth thoracic vertebra; for heart and aorta, at the level of the sixth thoracic vertebra.

ii) For AP projection (posterior view) of lungs and heart, performer has patient assume an erect seated or standing position, or a supine position with thorax elevated. Centers patient and cassette as described above. For supine patient, pronates the hands at the level of the hips and elevates elbows so as to draw scapulae outward; for erect patient adjusts as described above. For lungs, di-

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rects central ray at right angles to film, centered to the sternal angle; for heart, centers to the midsternum.

iii) For PA oblique projections (anterior oblique views) of the lungs and heart, performer notes whether left or right view is ordered, or both. Maintains patient in same position (standing or seated) as for PA projection. Has arms free at sides. Has patient turn to the right (for left oblique projection) 45°, 55° to 60°, or 10° to 20° as ordered; or to the left (for right oblique projection) with weight equally distributed. Centers film to the thorax, centered to the level of the 5th thoracic vertebra. For left PA oblique projection has left shoulder and breast in contact with cassette, with left hand on hip, palm down. Has patient raise right arm to shoulder level and grasp side of cassette for support. Adjusts shoulders to a single transverse plane, and has patient face straight ahead. Reverses position for right PA oblique projection. For study of lungs, directs central ray at right angles to center of film at level of fourth thoracic vertebra; for heart, to level of 6th or 7th thoracic vertebra.

iv) For AP oblique projections (posterior oblique views) of the lungs and heart, notes whether left or right view is ordered. Positions patient from the AP supine position. Adjusts and centers cassette as for PA oblique projections (iii); rotates patient on table to the desired side and angulation as described above. Supports elevated hip and arm. Has patient pronate hands beside hips. Directs central ray as described above in (iii).

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v) For PA lordotic projection (anterior view) of the lungs, has patient stand or sit in PA position before upright cassette holder or in prone position, with body centered to midline and cassette about one inch below upper border of shoulders, centered to the 4th thoracic vertebra. Has patient grasp sides of stand or table, brace abdomen against it, and lean backward as much as possible or with thorax at a 45° angle. For erect patient directs central ray at right angles to the film, centered to the fourth thoracic vertebra; for prone patient directs central ray 30° or 45° caudad.

vi) For AP lordotic projection (posterior view) of the lungs, has patient stand or sit in AP position one foot away from upright cassette holder. Centers cassette to the level of the midsternum, with upper margin of film about 1.5 inches above upper border of shoulders when patient is in position. Performer may mark a point just above the vertebra prominens, and a point over the upper edge of the manubrial notch. Has patient lean backward until the plane described by the two points is at right angles to the plane of the film. Has patient flex elbows and place back of hands on hips, resting shoulders against cassette for support. If so ordered, rotates body 30 degrees with affected side towards the film (for oblique projection). Directs central ray at right angles to film, centered to the level of the midsternum.

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vii) For lateral projection of the lungs and heart, performer notes whether left or right lateral has been ordered. Has patient stand or sit with arms at sides in front of upright cassette holder, with side of interest next to film. Centers cassette so that upper border of film is about 1.5 inches above shoulders, centered to the thorax, with the midaxillary line of the body about 2 inches posterior to midline of film. Has patient stand or sit straight, with shoulder next to film resting against cassette holder. Has patient extend arms directly upwards, flex elbows, and rest forearms on head. May have patient extend arms forward and hold on to vertical support stand. Makes sure median sagittal plane of body is vertical. For lungs, directs central ray at right angles to film, centered to the fourth thoracic vertebra; for heart centers to the sixth or seventh thoracic vertebra.

viii) For ventral or dorsal lateral projections of lungs and pleurae (for fluid level study), performer adjusts patient in PA prone or AP supine position on table as ordered, and elevates thorax with patient's arms above head. Places cassette vertically against affected side so that the laryngeal prominence is included and film is centered at the level of the fourth thoracic vertebra. Directs central ray at right angles to midpoint of film.

ix) For frontal projection (AP or PA) of lungs and pleurae (for fluid level and/or pneumothorax study); performer has patient assume a lateral recumbent position lying on the side ordered. If patient

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is lying on affected side, elevates body somewhat from surface of table. Places and supports cassette vertically against anterior surface of chest for PA projection and against posterior surface of chest for AP projection, centered to the fourth thoracic vertebra, with film edge extending about two inches beyond shoulders. Has patient extend arms well above head. Adjusts thorax in a true lateral position with respect to the plane of the film. Directs central ray at right angles to film through the midpoint of the field at the level of the fourth thoracic vertebra.

e. If, during positioning, patient shows signs of severe pain, performer may notify appropriate physician at once and await orders, or may decide on alternative positioning to avoid movement of the affected part.

13. Performer rehearses patient in the type of breathing that will be required for the exposure(s):

a. Performer has patient breathe lightly in shallow, rapid breaths for oblique projections of the sternum (if so ordered), frontal projection of upper ribs (if so ordered), or breathe quietly for lateromedial projection of the sternum (if so ordered).

b. Performer has patient simply hold breath for lateromedial projections of sternum (if so ordered) and sternoclavicular articulations.

c. Performer has patient breathe deeply, and exposes film while the patient is breathing in for projections of the trachea.

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d. Performer has patient breathe out fully and hold for oblique projections of the sternum (if so ordered), for frontal projections of the sternoclavicular articulations, projections of the ribs below the diaphragm, and for the second exposure in studies such as foreign body search, diaphragm excursion, pneumothorax, or fluid levels.

e. Performer has patient breathe in deeply and hold for lateral projections of the sternum and sternoclavicular articulations, projections of the ribs above the diaphragm, the costal joints, pulmonary apices, survey films of the heart and lungs, for the first of the two exposures for foreign body search, diaphragm excursion, pneumothorax and fluid levels; performer may ask patient to breathe in deeply, breathe out,and then breathe in again and hold on the second breath.

f. For cardiac series performer gives patient container with barium mixture or holds for patient depending on patient's position and condition. Has patient take two or three swallows of the mixture,and then take about a tablespoonful and hold this bolus in mouth until instructed to take a deep breath and swallow just before exposure.

14. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size (or the size of the unshielded area of the film to be exposed). Uses cross-hair shadows as reference for center of field. Uses the collimator light to center the patient to the x-ray field, or centers the part to the film holder and uses the collimator light to center the tube to the part. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired. May readjust tube position lengthwise or crosswise to provide better centering.

15. Once the patient has been positioned and immobilized, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). For small fields performer may attach an auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the part(s) of interest.

16. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that proper protective shielding has been provided to patient and everyone who will remain in room.

17. Throughout procedure performer observes patient for any signs of emergency and/or to prevent or respond to an accident. Is alert to signs of nausea, dizziness or sweat suggesting faintness. Performer may have patient lie down, lower head or raise legs. Notifies nurse. If patient shows any other emergency signs, loses consciousness, or has an accident,performer calls appropriate physician or nurse at once. May decide to provide emergency first aid as well. If a patient's urinary catheter becomes disconnected, performer clamps it and immediately notifies nurse. If catheter should come out, notifies nurse at once. Makes sure any suction equipment is clear and functioning.

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18. When everything is ready for the exposure, performer reminds patient of the breath control to be used for exposure, and about those exposures in which position is to be retained for a second exposure. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

19. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to swallow bolus of barium and/or breathe as rehearsed by calling or using intercom.

    a. If patient is not conscious and/or cannot suspend respiration, performer times exposure to the patient's natural breathing cycle (i.e. at inspiration or expiration as appropriate).
    b. Performer initiates exposure by pressing hand trigger or exposure control button.
        i) While exposure is underway, performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
        ii) May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.
        iii) With phototimer notes whether backup timer has been involved in terminating exposure before photo-timed exposure was completed. If so, anticipates possible need to repeat exposure (due to underexposure if premature cut-off, or overexposure due to faulty timer).

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        iv) After exposure is completed tells patient that he or she can relax.
        v) If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

20. Performer returns to patient. Removes cassette or film holder from table, floor or bucky.

    a. Removes any markers for further use. If multiple views are to be taken on the film, removes leaded rubber mask and remasks all but next area to be exposed.
    b. If the patient is being examined for possible fracture or if so requested, performer arranges to have the first exposure processed at once and brought to the appropriate radiologist.
    c. If the first radiograph(s) are preliminary (scout) films, performer brings the processed radiograph(s) directly to the radiologist in charge or places on view boxes and informs radiologist that the scout(s) are ready. If the radiologist indicates that there is any problem with the technical factors or the patient positioning, performer records or notes for later use in the examination and/or repeats preliminary radiography as ordered.
    d. Depending on whether radiologist will evaluate radiographs before completion of all possible exposures for the series, performer arranges to process film(s) and evaluate for quality control personally, have this done, or bring to dark room for processing and

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later evaluation, based on time available, institutional arrangements, or specific instructions. Attaches ID card for use with flasher if appropriate. May sign requisition. With chest x-ray equipment may decide when to remove receiving magazine of exposed films from machine and take to darkroom for processing. Returns with empty magazine and replaces in machine. May wait until all films in loading magazine are exposed, depending on the urgency of the study.

e. While films are being processed and/or evaluated, performer has patient relax in examination room or holding area. Explains what will happen next.
   i) Performer determines whether patient should remain on table and/or in room until physician arrives, and whether patient requires observation. If appropriate, arranges to have patient attended while waiting.
   ii) If patient is to leave table or rise, performer makes sure all equipment is moved away from patient such as overhead tube and upright film holder.
   iii) May decide to assist patient to chair or stretcher or from chair or table. Makes sure to remind patient of any footrest when stepping off table.

21. When (or if) performer learns from the radiologist the extent of the injury and/or whether further conventional views and/or positions can be undertaken, eliminated, or altered, performer proceeds as appropriate according to instructions.

   a. For further exposures performer repeats appropriate steps for next view(s) including identification of

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film holder and use of R-L marker, selection and setting of technique for next view (if different), positioning patient and equipment for focus-object-film alignment, proper collimation and shielding, breathing instructions, and making exposure, as described. For bilateral exposures on one film, keeps R-L reference constant.

   b. Performer refrains from commenting on the films or providing any interpretation.
   c. If performer is asked to repeat any exposures, makes sure that the additional exposures are warranted medically, since additional radiation will be incurred.
      i) Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."
      ii) If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member.
      iii) If request for retakes reflects the preference for density or contrast of a radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.

22. When performer is sure that the examination has been completed, performer may have patient transported back to holding area or next location, or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise.

23. Performer carries out termination steps for the examination:

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List Elements Fully	List Elements Fully
a. Performer has equipment and examination table cleaned after use or decides to do personally, depending on institutional arrangements. b. Performer records the examination according to institutional procedures. May include date, room, examination type, the views taken, the technical factors used, and film sizes. For heart series may include patient's weight, height and age in the appropriate record form. Performer may record the number of exposures made of each view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. If any views called for in the initial request could not be obtained performer may record reasons. Signs requisition sheet. c. If performer will only carry out preliminary "scout" filming and another technologist will continue with examination, performer records the approved technical factors used for the scouts and the accessories employed, or informs technologist who will continue. Performer gives the requisition sheet, name card, and any notes to technologist who will continue with procedure. d. Performer may decide to jacket films, requisition sheets, and related materials and/or have information recorded in log book personally or have this done, depending on instititional procedures. e. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

TASK DESCRIPTION SHEET

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This is page 1 of 13 for this task.

1. **What is the output of this task?** (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured,positioned;parts measured;films identified;technical factors selected and set; exposures made; radiographs sent for processing and evaluation; procedures repeated as appropriate for full set of views; patient returned; examination recorded; radiographs placed for use.

2. **What is used in performing this task?** (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, technical history;pen;x-ray machine control panel(s), tube,bucky,table,collimator,extension cones;technique chart;charts for conversion of technique,standard examination views,dosage,tube capacity;loaded cassettes;vertical film holder;leaded rubber shielding;R-L and ID markers;immobilization devices;stool; calipers;tape;scissors;protractor;compression band; stretcher or wheelchair

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. **If "Yes" to q. 3:** Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-infant patient to be radiographed; radiologic technologist; radiologist; nurse

5. **Name the task** so that the answers to questions 1-4 are reflected. Underline essential words.

Taking plain film radiographs of abdominal contents of non-infant patient by reviewing request;reporting observed contraindications;reassuring pt.;measuring part;selecting and setting technical factors;identifying film;positioning pt. and equipment for erect or recumbent exposure; providing shielding;collimating; making exposure; having radiographs processed and reviewed; repeating for full set of views or as ordered; having pt. returned; placing radiographs for use; recording examination.

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Performer receives or obtains the x-ray requisition form,patient's identification card, and any appropriate medical-technical history for a non-infant patient scheduled for radiography of the abdomen, including the liver, spleen, kidneys, bladder, diaphragm, abdominal aorta and intra-abdominal cavities:

a. After checking assignment on schedule sheet.
b. From co-worker.
c. After having arranged requisitions in order of priority.

The plain films of the abdomen may be to determine whether there is evidence of free gas and/or fluid levels, intra-abdominal tumor masses, calcifications,and/or foreign bodies. The plain films may be part of an abdominal series or a KUB (kidneys, ureters, bladder) series. The plain films may serve as preliminary "scout" films for contrast studies such as of the urinary system, abdominal fistulae or sinuses, biliary system, intestinal obstructions, etc.

1. Performer reads the requisition sheet to determine the examination called for, purpose, the patient involved, special considerations, and to check the completeness of the information provided:

   a. Performer checks the examinations called for and the purpose, noting whether air or fluid levels, foreign

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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body, tumor mass or calcifications are to be examined, whether routine series, and/or particular organs are to be examined, such as kidneys, liver, spleen. Notes the affected areas, the patient positions and projections called for, the number of exposures, the central beam angulation, the areas of interest and parts to be included. Notes whether the use of a grid or bucky will be involved. Checks the name of the referring physician.

b. Performer reads patient's name, identification number, sex, age, weight. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information that will affect patient positioning, technique, or handling of the patient, such as presence of acute abdominal signs, known pathologies.

c. With patients who are to undergo subsequent contrast studies, performer may note whether orders for prior preparation such as evacuation or emptying bladder (or keeping bladder full) have been given and carried out; if not already done, may arrange to have orders carried out or informs appropriate staff member.

d. Performer notes whether there are special orders for use or nonuse of compression devices.

e. If patient is acutely ill, performer checks whether use of erect position is expressly ordered. Checks with radiologist if unclear; does not plan for erect positioning without express permission.

f. Performer checks whether patient is suffering from a collateral condition requiring special handling, such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter, colostomy, T-tube or similar device in place; notes whether patient will be accompanied by nurse or other staff person, whether there are orders for removal of dressings from the abdominal area.

g. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved. Goes to examination room or control room for machine involved.

h. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete. Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

i. Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether number of radiographic exposures ordered or done in past should be reported to radiologist.

j. Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus. Notes shielding needed.

k. If patient's record indicates orders for sedation or any other prior medication, performer may check timing to be sure a proper elapse of time has occurred for medication to take effect. May arrange to delay examination if appropriate.

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1. If referring physician has requested that films already on file be sent with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer notifies supervisor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

3. When performer is clear about what will be involved in examination, he or she prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Performer reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).
   b. Performer washes hands as appropriate; depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
   c. Performer makes sure that x-ray equipment is ready for use. Goes to control panel for x-ray generator and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for machine to "warm up." If appropriate, performer may set radiography mode selector and set collimator control for manual operation.
   d. Performer checks that appropriate immobilization devices such as sandbags, wedge sponges, compression band, are present and that there is a mattress, pads, pillows, and/or blankets for comfort of patient if patient will lie on table. If appropriate, obtains protractor, cardboard triangles, device to support erect patient, objects to stand on to compensate for limbs of unequal length.
   e. Checks that there is leaded rubber shielding available in room to be used to protect the patient, and/or to place beneath the film holder, as appropriate.
   f. Performer prepares for identification of the films using equipment provided by institution:
      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
      iii) Checks identification against requisition sheet.
      iv) Performer makes sure that right (R) and left (L) markers are available for use.

4. Performer has the patient called from the holding area and prepared for the

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examination (if not already done), or decides to do personally.

a. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

b. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

c. Has patient assume a comfortable position seated on table or chair. If patient is in wheelchair, moves patient in chair into position next to table. If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move patient to table. With acutely ill patient uses upright film holder with patient remaining on stretcher.

d. Explains to patient what will be involved in the procedure;indicates positions patient will be asked to assume,the cooperation that will be asked of the patient. May ask patient to refrain from swallowing if possible.

e. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains when asked medical questions that it is

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not appropriate for technologist to answer these; encourages patient to speak to physician.

f. If patient has an IV drip in place performer checks that needle has not become dislodged and that the fluid is dripping at an even rate. If there are any problems,performer clamps tube and notifies appropriate staff person at once.

g. If patient has a wound, colostomy, ileostomy,or T-tube with dressing to be removed, performer checks whether zinc or iodoform paste or radiopaque gauze is being used. If so, has appropriate staff member remove dressing or tube or decides to do personally (if appropriate). Checks that radiopaque paste or gauze is completely removed.

h. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs appropriate physician and proceeds only with approval.

i. Makes sure that all garments except gown are removed down to below the area of interest. Keeps body covered until ready for positioning and exposure. Reveals only as much of body as necessary. Treats young patient with as much courtesy as adult.

5. Performer questions patient and/or RN or MD present on what movement is possible to determine what positions are available for use.

a. For abdominal series,especially for air or fluid levels, notes whether routine use of erect position is possible. May plan for use of supine position followed by

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upright filming (if possible) or, if not possible, by patient in lateral decubitus position. May plan to employ semierect position for patient who cannot assume either position by using footrest and compression so that patient can be brought to almost upright position on table.

b. Performer notes the patient's body type, whether the area of interest is heavily covered by muscle or soft fat, whether the palpation points will be easy to find. Notes whether the lower extremities are of unequal length. Notes whether tall patient will require two exposures for views ordered, one centered to include the diaphragm and the second centered to include the pelvic area. Notes whether thin patient will need padding under bony prominences.

c. Performer considers whether conventional positioning can be utilized or what alternative x-ray tube and patient positions to use to accomplish the equivalent radiography with a minimum of movement by the patient.

d. Performer considers the number and types of projections ordered for the examination and the patient's condition. Performer may consider a change from standard projections to better accomplish the purpose of the examination, or deletion of a position, or a change in technical factors. Depending on institutional arrangements, performer may obtain permission from appropriate radiologist or decides personally to alter the standard procedure.

6. Depending on whether a bucky or table top technique will be used and standard institutional practices, performer selects speed and type of film, grid, and cassette combination.

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a. Selects size(s) based on the area (s) to be included, the patient's size, and whether two exposures (and cassettes) will be needed to present a given view.

b. Performer makes sure that an adequate supply of loaded cassettes of the types and sizes selected are available in the examination room. If not, arranges to obtain or decides to obtain personally.

7. Performer prepares for the examination:

a. Performer obtains the appropriate size loaded cassette for the first projection.

b. Performer attaches identification information to the cassette or table top:

   i) Places right or left marker on film holder or table-top as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.

   ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of cassette.

   iii) If patient identification information is to be entered by use of flasher, sets flashcard aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.

   iv) Performer may place patient's card into card tray for equipment using automatic film marking device.

c. If cassette is to be used with bucky (under tabletop or in upright holder) performer may manually pull out bucky tray and open

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retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.

d. If a bucky is not being used, performer places cassette in a position that can be comfortably reached by the patient in final positioning. If appropriate to make possible minimal movement of patient, performer may place cassette in upright holder at right angles to table top or in other position selected.

e. Performer provides patient and everyone who will remain in room during exposure with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

8. Performer has patient assume a comfortable recumbent or seated or standing position depending on the positions to be employed, so that the part(s) to be radiographed can be measured.

   a. If appropriate, places mattress, pillow, or clean linen on x-ray table.

   b. Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way and may be collided with by patient. Locks chair.

   c. If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.

   d. Performer uses centimeter calipers to measure the thickness of the part(s) to be radiographed in the direction in which the central ray of the x-ray beam will pass through

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the centered part from tube to film. Records for use in determining exposure factors.

   e. If patient has a urinary catheter in place, performer turns patient toward the catheter and tubing to prevent separating it from drainage bottle and breaking sterile system and to avoid causing pain.

   f. After measuring, has patient rest in as relaxed a position as possible. May place pad, blanket or pillow under bony prominences to provide comfort.

   g. If patient is to be examined (next) in the lateral decubitus or erect position, performer has patient remain in that position for an appropriate amount of time before making the exposure(s).

9. Performer selects the exposure factors for the first projection by consulting the technique chart(s) posted for the machine:

   a. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other radiographic accessories (such as screens, grids, bucky, etc.).

   b. Makes note of the kVp, mA,T(seconds of exposure time), focal spot size, and the focal film distance (TFD or FFD) called for.

   c. Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for the pathological condition being studied, change in TFD, extreme fat or muscularity, preference of the radiologist involved, and any

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other conversion needed. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies,divides, adds, or subtracts as appropriate.

d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

10. Performer sets exposure factors as selected:

a. Enters control room. Makes sure that indicator light shows that x-ray generator is ready for use. Makes sure that all circuits have been stabilized.

b. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.

c. For conventional exposure control:

i) Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.

ii) Performer selects and sets the exposure time that will produce the mAs desired.

iii) Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

d. For automatic phototimed exposure control:

i) Performer selects and sets the category corresponding to the type of study and use or non-

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use of screens, bucky, etc., and, if appropriate, focal spot size.

ii) Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).

iii) May select and set a kVp range button (if called for with equipment) corresponding to range for examination.

iv) Sets a density selector corresponding to the usual (or special) requirements for the study.

v) Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.

e. Depending on the equipment, may set controls to provide for use of bucky, manual tableside adjustment of table and tube height, position, and of collimation.

f. Performer returns to overhead unit and sets the focal-film distance. Operates controls or manually moves the x-ray tube into place over the film holder (or at right angles to upright holder). Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.

11. Performer prepares patient for the final position selected for the first (or next) exposure. Makes sure that correct side is being positioned when appropriate.

a. May explain or demonstrate to patient what is required. May obtain help in positioning or has MD position in accident or acute cases.

b. Performer centers part and keeps the long axis of the part par-

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allel to the film holder. When using a bucky, centers patient to midline. With cassette on table top, centers film to part. With upright holder adjusts height of holder to part and centers part to film.

c. When positioning a patient with a balloon catheter in place, performer makes sure that the clamp is not lying over a part to be exposed or that patient is not lying on the clamp.

12. Performer positions as follows (unless nonconventional positioning is being used to avoid having patient move):

    a. For studies of abdominal contents (or KUB), performer notes the purpose of study and sequence of positions selected. For conventional abdominal series makes supine AP projection of abdomen, followed by erect AP or PA projection of abdomen, or erect lateral projection of abdomen. For demonstration of air or fluid level, makes supine AP of abdomen, followed by an erect or lateral decubitus view. For frontal AP projections of abdomen, performer selects the supine AP and the erect PA position unless otherwise specified (such as with kidney examination or acutely ill patient). For acutely ill patient performer substitutes semierect position for erect.

        i) For supine AP projection (posterior view) of abdomen (or KUB), performer aligns patient in supine position, with the median sagittal plane of the body centered to the midline of the table. Supports knees and immobilizes ankles. Adjusts shoulders so that they lie in a single transverse plane, with arms at sides. Centers a single cassette

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high enough to include the diaphragm (estimates location from patient's body type) at the level of the iliac crests, and includes the pelvic area. Centers the first of two cassettes (for tall patient) high enough to include the diaphragm; centers second cassette about two inches above the upper border of the symphysis pubis. May apply compression band. Performer directs central ray at right angles to midpoint of film.
        For erect AP projection performer positions as described above, with patient standing or seated in front of upright cassette holder, centered to midline, facing away, and with weight distributed equally. Supports the shorter extremity if of unequal length.

        ii) For erect PA projection (anterior view) of abdomen, performer has patient stand facing erect vertical cassette holder or table, centered to the midline, and with weight equally distributed. Has patient extend arms along sides of holder and grasp edges. Centers cassette about one inch above the crest of the ilium or as described above; includes the diaphragm. May apply compression band. Performer makes sure that patient is maintained in erect position long enough before exposure for air or fluid levels to be accurately demonstrated. Directs central ray at right angles to center of film.

        iii) For lateral decubitus positioning (for frontal or lateral projections), performer notes which side of the patient's body is to be next to film holder and

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has patient lie on that side in a lateral recumbent position. Has patient flex knees comfortably, and centers abdomen to midline. Places supports under and between knees and ankles. Has patient flex elbows, place lower hand under head, and has patient grasp side of table with opposite hand. For fluid level study, elevates the torso.

For lateral projection, performer centers cassette in bucky or on table under patient. For frontal projection, performer centers cassette in upright holder in front of patient (for PA projection) or behind patient (for AP projection). Centers film at the level of the iliac crests or as described above in (i).

For lateral projection directs central ray vertically at right angles to midpoint of film. For frontal projection directs central ray horizontally at right angles to the midpoint of film through the median line of body. For air or fluid levels allows patient to maintain position long enough before exposure for air or fluid levels to be accurately demonstrated.

For acutely ill patients who cannot assume erect or lateral decubitus position, performer adjusts patient in semierect position by starting with supine position as in (i), above. Attaches footrest to end of table and secures patient. May use compression bands. With patient on table, performer moves it to almost vertical position. For AP semierect projection, centers as above with cassette in bucky; for lateral projection, centers cassette in vertical film holder on right or left side of patient (depending on the side of interest). Directs central ray horizontally to the midpoint of the film, regardless of the angulation of the table. Allows time for air or fluid level to be properly demonstrated as described above.

b. For studies of the liver and spleen, performer does not use compression.
   1) For AP projection (posterior view) of liver and spleen, performer positions patient in supine position as described in (a), above. Has patient flex elbows and abduct arms. Centers a single cassette so that about one inch of the iliac bones are included on lower border of film. If patient is too tall for a single cassette, centers first cassette to include the diaphragm and second to include the iliac crests. Directs central ray at right angles through the xiphoid process
   ii) For oblique AP projection of spleen, performer starts with patient in supine position and elevates right side of body about 40° to 45° so that spleen is nearest to film. Supports elevated shoulder and hip, with arms comfortably placed and shoulders lying in a single transverse plane. Centers film at or just below the level of the xiphoid process. Directs central ray at right angles to midpoint of film.
   iii) For PA projection (anterior view) of liver, performer notes whether a preliminary film or a diagnostic examination is involved. Has patient assume a prone position with

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the median sagittal plane of body centered to midline,and elbows flexed comfortably. Adjusts shoulders to lie on a single transverse plane. Supports ankles. Performer centers cassette to the central ray. Reminds patient(if diagnostic study)that two exposures will be made.

For preliminary or general survey examination, directs central ray at right angles through the xiphoid process. For diagnostic examination directs central ray through the xiphoid process at 25° caudad for first exposure, and at 10° cephalad for the second exposure.

c. If, during positioning, patient shows signs of severe pain, performer may notify appropriate physician at once and await orders, or may decide on alternative positioning to avoid movement of the affected part.

d. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size. Uses cross-hair shadows as reference for center of field. Uses the collimator light to center the patient to the x-ray field, or centers the part to the film holder and uses the collimator light to center the tube to the part. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired. May readjust tube position lengthwise or crosswise to provide better centering.

13. Once the patient has been positioned and immobilized, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the

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area of interest (and thus provide maximum protection and detail). For small fields performer attaches an auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the part(s) of interest.

14. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that proper protective shielding has been provided to patient and everyone who will remain in room.

15. Throughout procedure performer observes patient for any signs of emergency and/or to prevent or respond to an accident. Is alert to signs of nausea, dizziness, or sweat suggesting faintness. Performer may have patient lie down, lower head, or raise legs. Notifies nurse. If patient shows any other emergency signs, loses consciousness, or has an accident, performer calls appropriate physician or staff member at once. May decide to provide emergency first aid as well. If a patient's catheter becomes disconnected, performer clamps it and immediately notifies nurse. If catheter should come out, notifies nurse at once.

16. When everything is ready for the exposure, performer explains to patient what breath control will be used for exposure. Rehearses breathing out when told to do so by performer and holding breath until told to relax. If appropriate, instructs patient not to swallow before and during the examination. Reminds patient about those exposures in which position is to be retained for a second exposure. Observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

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17. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to breathe out and hold still by calling or using intercom. Performer may wait one or two seconds after suspension of respiration. Initiates exposure by pressing hand trigger or exposure control button.
    a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
    b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.
    c. With phototimer notes whether backup timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure (due to underexposure if premature cut-off, or overexposure due to faulty timer).
    d. After exposure is completed tells patient that he or she can relax.
    e. If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

18. Performer returns to patient. Removes cassette or film holder from table, holder, or bucky.
    a. Removes any markers for further use. If so requested, performer arranges to have the first exposure(s) processed at once and brought to the appropriate radiologist.
    b. If the first radiograph(s) are preliminary (scout) films, performer

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brings the processed radiograph(s) directly to the radiologist in charge or places on view boxes and informs radiologist that the scout (s) are ready. If the radiologist indicates that there is any problem with the technical factors or the patient positioning, performer records or notes for later use in the examination and/or repeats preliminary radiography as ordered.
    c. Depending on whether radiologist will evaluate radiographs before completion of all possible exposures for the series, performer arranges to process film(s) and evaluate for quality control personally, have this done, or bring to darkroom for processing and later evaluation, based on time available, institutional arrangements, or specific instructions. Attaches ID card for use with flasher if appropriate. May sign requisition.
    d. While films are being processed and/or evaluated performer has patient relax in examination room or holding area. Explains what will happen next.
        i) Performer determines whether patient should remain on table and/or in room or requires observation. May consult requisition sheet or attending RN. If appropriate, makes sure that patient will be attended while waiting.
        ii) If appropriate, moves x-ray tube and any protruding film holder away from patient before patient rises.
        iii) May decide to assist patient to chair or stretcher or from table. Makes sure patient is reminded of any footrest in stepping off table.

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iv) If patient is to switch to erect position or lateral decubitus position for fluid or air level study, has patient take and maintain that position for the required amount of time prior to next exposure.

19. When (or if) performer learns from the radiologist the extent of the injury and/or whether further conventional views and/or positions can be undertaken, eliminated or altered, performer proceeds as appropriate according to instructions.

    a. For further exposures performer repeats appropriate steps for next view(s) including identification of film holder or cassette and use of R-L marker, selection and setting of technique for next view (if different), positioning patient and equipment for focus-object-film alignment, proper collimation and shielding, breathing instructions, and making exposure, as described above.
    b. Performer refrains from commenting on the films or providing any interpretation.
    c. If performer is asked to repeat any exposures, makes sure that the additional exposures are warranted medically, since additional radiation will be incurred.
        i) Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."
        ii) If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member.
        iii) If request for retakes reflects the preference for density or contrast of a radiologist, performer notes for future work

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done for the given radiologist so that retakes can be avoided.

20. When performer is sure that the examination has been completed, performer may have patient transported back to holding area or next location, or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient as described above.

21. Performer carries out termination steps for the examination:

    a. If appropriate, arranges to have fresh colostomy and/or dressing applied (if removed for radiography).
    b. Performer has equipment and examination table cleaned after use or decides to do personally, depending on institutional arrangements.
    c. Performer records the examination according to institutional procedures. May include date, room, examination type, the views taken, the technical factors used and film sizes; may record the number of exposures made of each view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. If any views called for in the initial request could not be obtained, performer may record reasons. Signs requisition sheet.
    d. If performer will only carry out preliminary "scout" filming and another technologist will continue with examination, performer records the approved technical factors used for the scout, and the accessories

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employed, or informs technologist who will continue. Performer gives the requisition sheet, name card, and any notes to technologist who will continue with procedure. e. Performer may decide to jacket films, requisition sheets, and related materials and/or have information recorded in log book personally or have this done, depending on institutional procedures. f. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

TASK DESCRIPTION SHEET

Task Code No. 364

This is page 1 of 11 for this task.

1. **What is the output of this task?** (Be sure this is broad enough to be repeatable.)

Requisition reviewed;patient reassured,positioned; parts measured;films identified;technical factors selected and set;instructions given for breathing, phonation,maneuver,swallowing;exposures made;radiographs sent for processing and evaluation;procedures repeated as appropriate for full set of views;patient returned;examination recorded;radiographs placed for use.

2. **What is used in performing this task?** (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, technical history;pen;x-ray machine control panel(s),tube,bucky,table,collimator,extension cones; technique chart;charts for conversion of technique, views for standard examinations,dosage,tube capacity; loaded cassettes;upright film holder;leaded rubber shielding;R-L and ID markers;immobilization and support devices;compression band;head clamp;calipers; stool;barium sulfate cream;water in cup;ribbon; stretcher or wheelchair;barium-soaked pledget

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-infant patient to be radiographed;radiologic technologist; radiologist; nurse

5. **Name the task** so that the answers to questions 1-4 are reflected. Underline essential words.

Taking radiographs of anterior portion of the neck of non-infant patient by reviewing request;reporting observed contraindications;reassuring pt.;measuring part;selecting and setting technical factors;identifying film;positioning pt. and equipment for erect or recumbent exposure;providing shielding;collimating;instructing pt. in breathing,phonating,maneuver, or swallowing;making exposures;having radiographs processed and reviewed;repeating for full set of views or as ordered;having pt. returned;placing radiographs for use;recording examination.

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Performer receives or obtains the x-ray requisition form,patient's identification card, and any appropriate medical-technical history for a non-infant patient scheduled for radiography of the anterior portion of the neck (pharynx, larynx, upper end of esophagus):

a. After checking assignment on schedule sheet.
b. From co-worker.
c. After having arranged requisitions in order of priority.

The plain films of the anterior portion of the neck may serve as preliminary "scout" films for contrast studies of the upper portions of the respiratory or digestive systems, and other structures of the anterior neck. Requisition may require use of barium sulfate contrast medium.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided:

   a. Performer checks the examinations called for including the affected parts, the purpose of the study, the positions and views called for, any maneuvers or phonation called for, the location of any tumor masses to be studied, the nature of any foreign object to be localized, the

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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number of exposures, and the parts to be included in the projections. Notes whether the use of a grid or bucky will be involved. Checks the name of the referring physician.

b. Performer reads patient's name, identification number, sex, age, weight. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information that will affect patient positioning, technique, or handling of the patient, whether patient will be in a stretcher or wheelchair, and any notation on the nature of any known pathology which would affect technique. Notes type of shielding needed. If foreign body search is ordered, makes sure that the foreign body is known to be radiopaque.

c. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence, whether patient has IV drip or similar device in place; notes whether patient will be accompanied by nurse or other staff person.

d. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved. Goes to examination room or control room for machine involved.

e. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete. Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

f. Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether number of radiographic exposures involved should be reported to radiologist.

g. Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.

h. If patient's record indicates orders for sedation or any other prior medication, performer may check timing to be sure a proper elapse of time has occurred for medication to take effect. May arrange to delay examination if appropriate.

i. If referring physician has requested that films already on file be sent with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer notifies supervisor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

3. When performer is clear about what will be involved in examination, he or she prepares ahead so as not to keep patient in examination room longer than necessary:

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a. Performer reviews the technique chart for the machine to be used; takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).

b. Performer washes hands as appropriate; depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.

c. Performer makes sure that x-ray equipment is ready for use. Goes to control panel for x-ray generator and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for machine to "warm up." If appropriate, performer may set radiography mode selector and set collimator control for manual operation.

d. Checks that appropriate immobilization devices such as sandbags, wedge sponges, head clamp are present and that there is a mattress, pads, pillows, and/or blankets for comfort of patient. Checks that emergency cart is present, that there is leaded rubber shielding available.

e. If a foreign body search has been ordered, arranges to have water available for swallowing maneuver.

f. If a Valsalva or modified Valsalva maneuver is ordered checks whether this may be contraindicated by patient's condition and proceeds only with MD approval if there is any doubt.

g. If a deglutition study is ordered, checks that barium cream is ready for use.

h. Performer prepares for identification of the films using equipment provided by institution:

   i) May obtain lead numerals and tape and prepare identification

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   strip for placement on film holder(s) giving appropriate patient identification information.

   ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.

   iii) Checks identification against requisition sheet.

   iv) Performer makes sure that right (R) and left (L) markers are available for use.

4. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

   a. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

   b. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

   c. Has patient assume a comfortable position seated on table or chair. If patient is in wheelchair, moves patient in chair into position next to table. If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled

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base to x-ray table. May arrange to move patient to table. With accident patient uses upright film holder with patient remaining on stretcher until injury has been localized.

d. Performer explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

e. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains when asked medical questions that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

f. If patient has an IV drip in place, performer checks that needle has not become dislodged and that the fluid is dripping at an even rate. If there are any problems, performer clamps tube and notifies an appropriate staff person at once.

g. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs appropriate physician and proceeds only with approval.

5. Performer questions patient and/or RN or MD present on what movement is possible to determine what positions are available for use. Considers whether to have patient erect (seated or standing) or recumbent, or considers orders in the light of the patient's condition.

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a. Performer selects erect seated or standing position unless otherwise indicated, especially for tumor masses and foreign body search. Plans on lateral projection for foreign body search.

b. If a cardiac patient is involved, performer selects recumbent position unless otherwise indicated.

c. If the study involves examination of tumor masses, performer locates the mass visually so as to be able to position patient appropriately.

d. Performer considers the number and types of projections ordered for the examination and the patient's condition. Performer may consider a change from standard projections to better accomplish the purpose of the examination, or deletion of a position, or a change in technical factors. Depending on institutional arrangements, performer may obtain permission from appropriate radiologist, or decides personally to alter the standard procedure.

6. Performer prepares for the examination:

a. If not already done, has patient remove clothing, hair pins, and any jewelry around neck. Makes sure that all garments except gown are removed down to below the area of interest. If patient has a wet dressing, performer has it reinforced or decides to do personally.

b. Depending on whether a bucky or table top technique will be used and standard institutional practices, performer selects speed and type of film, grid, and cassette combination. Selects size(s) based on the area(s) to be included and the patient's size.

c. Performer makes sure that an adequate supply of loaded cassettes of

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the types and sizes selected are available in the examination room. If not, arranges to obtain or decides to obtain personally.

d. Performer obtains the appropriate size loaded cassette for the first projection and attaches R or L marker and identification information to the cassette or table top or uses automatic marking device.

e. If cassette is to be used with bucky (under table top or in upright holder) performer may manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.

f. If a bucky is not being used, performer places cassette in a position that can be comfortably reached by the patient in final positioning. If appropriate to make possible minimal movement of patient, performer may place cassette in upright holder at right angles to table top or in other position selected.

g. Performer provides patient and everyone who will remain in room during exposure with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

7. Performer has patient assume a comfortable recumbent, standing, or seated position, depending on the positions to be employed, so that the part(s) to be radiographed can be measured. Makes sure that wheelchair is in locked position if patient is to be positioned in it.

   a. If appropriate, places mattress, pillow, or clean linen on x-ray table.

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   b. Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way and may be collided with by patient. Locks chair.

   c. If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.

   d. Performer uses centimeter calipers to measure the thickness of the part(s) to be radiographed in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors.

   e. After measuring, has patient rest in as relaxed a position as possible. May place pad, blanket or pillow under bony prominences to provide comfort.

8. Performer selects the exposure factors for the first projection by consulting the technique chart(s) posted for the machine:

   a. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed,and use or nonuse of other accessories for filming (such as screens, grids, bucky, etc.).

   b. Makes note of the kVp, mA, T(seconds of exposure time), focal spot size, and the focal film distance (TFD or FFD) called for.

   c. Once the standard kVp, mA and time have been determined, performer notes whether any conversions are

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necessary to account for a pathological condition present, a change in TFD, extreme obesity, preference of the radiologist involved, and/or any other conversion needed. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies,divides, adds, or subtracts as appropriate.

d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

9. Performer sets exposure factors as selected:

   a. Enters control room. Makes sure that indicator light shows that x-ray generator is ready for use. Makes sure that all circuits have been stabilized.
   b. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.
   c. For conventional exposure control:
      i) Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.
      ii) Performer selects and sets the exposure time that will produce the mAs desired.
      iii) Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.
   d. For automatic phototimed exposure control:

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      i) Performer selects and sets the category corresponding to the type of study and use or nonuse of screens, bucky, etc., and if appropriate, focal spot size.
      ii) Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).
      iii) May select and set a kVp range button (if called for with equipment) corresponding to range for examination.
      iv) Sets a density selector corresponding to the usual (or special) requirements for study.
      v) Makes sure backup timer is not likely to terminate exposure before phototimed exposure.
   e. Depending on the equipment, may set controls to provide for use of bucky, manual tableside adjustment of table and tube height, position, and of collimation.
   f. Performer returns to overhead unit and sets the focal-film distance. Operates controls or manually moves the x-ray tube into place over the film holder (or at right angles to upright holder). Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.

10. Performer prepares for final positioning for the first (or next) view:

   a. Performer explains or demonstrates what is required to patient.
      i) For scout films, performer rehearses patient in quiet nasal breathing; plans to make exposure just before the chest comes to rest at the end of an expansion, on inspiration.
      ii) If phonation has been ordered, performer demonstrates and

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rehearses patient in phonating a low pitched "a-a-h" and/or a high pitched, "e-e-e" sound, continuing until told to relax.

iii) If a Valsalva maneuver has been ordered, performer demonstrates and rehearses patient in taking a deep breath, holding breath in, and bearing down as though evacuating until told to relax.

iv) If a modified Valsalva maneuver has been ordered, performer demonstrates and rehearses patient in pinching nostrils together with the thumb and forefinger of one hand, closing mouth, and making a sustained but mild effort to blow nose until told to relax.

v) If an opaque foreign body search has been ordered for upper end of esophagus or pharynx, performer has patient practice swallowing by holding a sip of water in mouth until instructed to swallow, and then swallowing the water in one movement without swallowing again until told.

vi) For deglutition study, shows barium cream that will be swallowed. If a mucosal study is to follow, has patient rehearse swallowing and then not swallowing again until performer sets up for immediate exposure with modified Valsalva maneuver.

vii) If swallowing is involved, plans to make exposure at peak of the forward movement of larynx. May tie a dark colored ribbon or similar item around the patient's throat above the thyroid cartilage and check it to note the elevation of the ribbon at time of the exposure.

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b. If patient must be positioned in recumbent position on table because of condition, may position with table horizontal, then apply compression bands to support patient, put up footboard, and turn tilt-table to vertical position for final positioning and exposure.

c. If patient will be standing and limbs are of unequal length, provides support to shorter limb.

d. Performer centers part and keeps the long axis of the part parallel to the film holder. When using a bucky, centers patient to midline. With cassette on table top, centers film to part. With upright holder, adjusts height of holder to part and centers part to film.

11. Performer positions as follows (unless using nonconventional positioning to avoid having patient move):

a. For AP projection (posterior view) of pharynx and larynx, performer notes whether study involves visible tumor masses in neck.

i) Except for visible tumor masses, performer has patient stand or be seated in erect position with back to upright cassette holder, or, if necessary, aligned in AP supine position on table. Centers the median sagittal plane of the body to the midline of the film holder or table. For erect patient makes sure that weight is equally distributed on buttocks or feet. Adjusts shoulders to lie on a single transverse plane. Centers head and neck to eliminate any rotation and extends head slightly to prevent shadow of mandible from obscuring larynx. Immobilizes head. Centers film to the level of the laryngeal prominence or just below. Directs central ray

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at right angles to the laryngeal prominence.

ii) For demonstration of visible tumor masses in the neck, performer seats patient in AP position and centers film to the level of the mass. Performer rotates the patient's body so that the mass is tangent to the film (that is, so that the mass is in contact or near contact at one point). Directs central ray horizontally to the inner border of the mass.

b. For lateral projection of pharynx, larynx, or upper end of esophagus, performer reviews the area to be demonstrated and the purpose of the study:

i) Performer positions patient seated or standing in erect lateral position before upright cassette holder with indicated side adjacent to film. (May position patient in supine position as above and use horizontal x-ray beam across table, or may use supine AP position and move table into upright position for actual exposure.)
Adjusts erect patient so that the coronal plane passing through or anterior to the temporomandibular joints is centered to the midline of the film holder. Has patient rest adjacent shoulder against holder. Adjusts body in erect position so that median sagittal plane is parallel with plane of film. Depresses shoulders as much as possible and adjusts them to lie in a single transverse plane. Extends patient's head slightly. Immobilizes head or has patient visually fix on an object directly in line with forward visual axis.

ii) For demonstration of the nasopharynx, performer centers film

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one inch below the level of the external auditory meatuses. For demonstration of the oropharynx, performer centers film at the level of the mandibular angles. For demonstration of the larynx, hypopharynx, and upper end of the esophagus, performer centers film at the level of the laryngeal prominence. Performer directs the central ray at right angles to the midpoint of the film.

c. If, during positioning, patient shows signs of severe pain, performer may notify appropriate physician at once and await orders, or may decide on alternative positioning to avoid movement of part.

d. Reviews with patient the breathing, phonation, maneuver, or swallowing required for the exposure.

e. For opaque foreign object search, has patient take a sip of water and hold in mouth until told to swallow.

f. For deglutition study has patient take a bolus of barium cream in mouth and hold until told to swallow. Has patient refrain from swallowing again until new cassette is set up for next exposure, and then has patient perform modified Valsalva maneuver.

12. The performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size. Uses crosshair shadows as reference for

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center of field. Uses the collimator light to center the patient to the x-ray field, or centers the part to the film holder and uses the collimator light to center the tube to the part. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired. May readjust tube position lengthwise or cross-wise to provide better centering.

13. Once the patient has been positioned and immobilized, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film, or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). For small fields performer attaches an auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the part(s) of interest.

14. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that proper protective shielding has been provided to patient and everyone who will remain in room.

15. Throughout procedure performer observes patient for any signs of emergency and/or to prevent or respond to an accident. Is alert to signs of nausea, dizziness, or sweat suggesting faintness. Performer may have patient lie down, lower head, or raise legs. Notifies nurse. If patient shows any other emergency signs, loses consciousness, or has an accident, performer calls appropriate physician or nurse at once. May decide to provide emergency first aid as well. If a patient's catheter becomes disconnected, performer clamps it and immediately notifies

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nurse. If catheter should come out, notifies appropriate staff member at once.

16. When everything is ready for the exposure, performer reminds patient of breathing, phonation, maneuver, or swallowing instructions and of need to maintain it until patient is told to relax by performer. Observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

17. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to breathe quietly, phonate vowel sound, perform Valsalva or modified Valsalva maneuver, or swallow water, or bolus of contrast in one movement as rehearsed, by calling or using intercom. Performer initiates exposure by pressing hand trigger or exposure control button.

    a. While exposure is underway, performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
    b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.
    c. With phototimer notes whether backup timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure (due to underexposure if premature cut-off, or overexposure due to faulty timer).
    d. After exposure is completed tells patient that he or she can relax or reminds patient not to swallow until next exposure.

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e. If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

18. Returns to patient. Removes cassette or film holder from film stand, table, or bucky. Removes any markers for further use. Sets up for next exposure at once if appropriate and repeats steps.

   a. If so requested, performer arranges to have the first exposure processed at once and brought to the appropriate radiologist.
   b. If the first radiograph(s) are preliminary (scout) films, performer brings the processed radiograph(s) directly to the radiologist in charge or places on view boxes and informs radiologist that the scout (s) are ready. If the radiologist indicates that there is any problem with the technical factors or the patient positioning, performer records or notes for later use in the examination and/or repeats preliminary radiography as ordered.
   c. Depending on whether radiologist will evaluate radiographs before completion of all possible exposures for the series, performer arranges to process film(s) and evaluate for quality control personally, have this done, or bring to dark room for processing and later evaluation, based on time available, institutional arrangements, or specific instructions. Attaches ID card for use with flasher if appropriate. May sign requisition.
   d. While films are being processed and/or evaluated, performer has patient relax in examination room or holding area. Explains what will happen next.

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      i) Performer determines whether patient should remain on table and/or in room until physician arrives, and whether patient requires observation. If appropriate, arranges to have patient attended while waiting.
      ii) If patient is to leave table or rise, performer makes sure all equipment is moved away from patient such as overhead tube and upright film holder.
      iii) May decide to assist patient to chair or stretcher or from chair or table. Makes sure to remind patient of any footrest when stepping off table.

19. When (or if) performer learns from the radiologist whether further conventional views and/or positions can be undertaken, eliminated, or altered, performer proceeds as appropriate according to instructions.

   a. For further exposures performer repeats appropriate steps for next view(s) including identification of film holder and use of R-L marker, selection and setting of technique for next view (if different), positioning patient and equipment for focus-object-film alignment, proper collimation and shielding, instructions for breathing, phonation, maneuvering, or swallowing, and making exposure, as described above.
   b. Performer refrains from commenting on the films or providing any interpretation.
   c. If performer is asked to repeat any exposures, makes sure that the additional exposures are warranted medically, since additional radiation will be incurred.

      i) Notes whether need to repeat is due to performer's own negli-

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gence or lack of attention so that performer can avoid future "retakes."

ii) If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member.

iii) If request for retakes reflects the preference for density or contrast of a radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.

20. When performer is sure that the examination has been completed, performer may have patient transported back to holding area or next location, or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise.

21. Performer carries out termination steps for the examination:

    a. Performer has equipment and examination table cleaned after use or decides to do personally, depending on institutional arrangements.
    b. Performer records the examination according to institutional procedures. May include date, room, examination type, the views taken, the technical factors used, and film sizes. Performer may record the number of exposures made of each view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. If any views called for in the initial request could not be obtained, performer may record reasons. Signs requisition sheet.
    c. If performer will only carry out preliminary "scout" filming and

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another technologist will continue with examination, performer records the approved technical factors used for the scouts and the accessories employed, or informs technologist who will continue. Performer gives the requisition sheet, name card, and any notes to technologist who will continue with procedure.

    d. Performer may decide to jacket films, requisition sheets, and related materials and/or have information recorded in log book personally or have this done, depending on institutional procedures.
    e. May indicate to appropriate staff person when the performer is ready to proceed with next examination.

TASK DESCRIPTION SHEET

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This is page 1 of 44 for this task.

1. **What is the output of this task? (Be sure this is broad enough to be repeatable.)**

Requisition reviewed;pt. reassured,positioned;parts measured;films identified;technical factors selected and set;technique for magnification,bilateral filming,stereography set up;localization equipment and centering marks applied;exposures made;radiographs sent for processing and evaluation;procedures repeated as appropriate for full set of views;patient returned;examination recorded;radiographs placed for use.

2. **What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)**

Pt.'s x-ray requisition sheet,ID card,ID bracelet, technical history;pen;x-ray machine control panel(s), tube,bucky,table,collimator,extension cones;technique chart;charts for conversion of technique,standard examination views,dosage,tube capacity;loaded cassettes;occlusal film packets;upright film holder; leaded rubber shielding;R-L and ID markers;immobilization devices;precision localizer devices;face rest; head clamp,weighted band;tape;chair;calipers;protractor;triangles;stool;scissors;cork;wax marking pen; cassette tunnel;stretcher or wheelchair

3. **Is there a recipient, respondent or co-worker involved in the task?** Yes...(x) No...( )

4. **If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.**

Non-infant patient to be radiographed;radiologic technologist;radiologist;nurse

5. **Name the task so that the answers to questions 1-4 are reflected. Underline essential words.**

Taking plain film radiographs of the skull and/or face of non-infant patient by reviewing request;reporting observed contraindications;reassuring pt.; measuring part;setting up for magnification technique,bilateral exposures,stereography as ordered;selecting and setting technical factors;identifying film;applying localization marks and/or devices;positioning pt. and equipment for seated or recumbent exposure;providing shielding;collimating;making exposure;having radiographs processed and reviewed;repeating for full set of views or as ordered;having pt. returned;placing radiographs for use;recording examination.

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Performer receives or obtains the x-ray requisition form,patient's identification card, and any appropriate medical-technical history for a non-infant patient scheduled for radiography of the skull (cranium and/or facial bones, excluding paranasal sinuses):

a. After checking assignment on schedule sheet.
b. From co-worker.
c. After having arranged requisitions in order of priority.

The plain films of the skull may serve as preliminary "scout" films for contrast studies of the brain and other organs located in the skull; the plain films may be part of a bone-survey.

1. Performer reads the requisition sheet to determine the examination called for, purpose, the patient involved, special considerations, and to check the completeness of the information provided:

   a. Performer checks the examinations called for, including the parts involved and the affected areas, whether bilateral or unilateral views are requested, the patient positions and views called for, the number of exposures, the central beam angulation, the areas of interest and parts to be included. Notes whether there will be bilateral views on a single

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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film, whether the use of a grid or bucky will be involved. Notes any request for magnification. Checks the name of the referring physician.

b. Performer reads patient's name, identification number, sex, age, and weight. Notes whether patient is in-patient, out-patient, accident or emergency patient. Notes any special information that will affect patient positioning, technique, or handling of the patient, such as presence of accident injuries, unhealed or suspected fracture, degenerating disease, whether patient will be on a stretcher or wheelchair, the nature of any known pathology which would affect technique, and the purpose of the study.

c. With patients with accident injuries or unhealed fractures, performer may make sure that a surgeon or radiologist is available to position the patient; checks whether rotation and extension of head is contraindicated.

d. Performer checks whether patient is suffering from a collateral condition requiring special handling, such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter or similar device in place; notes whether patient will be accompanied by nurse or other staff person.

e. With patients who are to undergo subsequent contrast studies, performer may note whether orders for prior preparation have been given and carried out; if not already done, may arrange to have orders carried out, or informs appropriate staff member.

f. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved. Goes to examination room or control room for machine involved. Checks that proper shock-proof equipment is available in room for use in direct contact with patient's head.

g. If magnification has been requested, performer checks that the machine to be used has a fractional focal spot of appropriate size for direct magnification technique (i.e., 0.3 mm. or smaller).

h. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete. Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

i. Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether number of radiographic exposures ordered or done in past should be reported to radiologist.

j. Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus. Notes shielding needed.

k. If patient's record indicates orders for sedation or any other prior medication, performer may check timing to be sure a proper elapse of time has occurred for medication to take effect. May arrange to delay examination if appropriate.

l. If referring physician has requested that films already on file be

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sent with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer notifies supervisor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

3. When performer is clear about what will be involved in examination, he or she prepares ahead so as not to keep patient in examination room longer than necessary:

    a. Performer reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).
    b. Performer washes hands as appropriate; depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
    c. Performer may set up equipment as appropriate for stereographic projections if ordered.
    d. Performer makes sure that x-ray equipment is ready for use. Goes to control panel for x-ray generator and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for machine to "warm up." If appropriate, performer may set radiography mode selector and set collimator control for manual operation.
    e. Performer checks that appropriate immobilization devices such as sandbags, angle blocks, tape, weighted band, Granger face rest are present and that there is a mattress, pads, pillows, and/or blankets for comfort of patient if patient will lie on table. If appropriate, obtains protractor, cardboard triangles, cassette tunnels, localizer devices.
    f. Checks that there is leaded rubber shielding available in room to be used to protect the patient, and/or to place beneath the film holder, as appropriate.
    g. Performer prepares for identification of the films using equipment provided by institution:

        i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
        ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface, may write or type out ID information on card if not received with requisition.
        iii) Checks identification against requisition sheet.
        iv) Performer makes sure that right (R) and left (L) markers are available for use.

4. If magnification has been requested, performer prepares the equipment for

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the tube-over-table method of magnification (used without bucky):

a. Performer determines the degree of magnification requested on the requisition sheet; if the request is expressed as an area magnification performer determines the linear magnification by taking the square root. (Linear magnification squared equals area magnification.)

b. Performer calculates the required distances from target (focal spot) to object (patient) (TOD), and from object to film (OFD), as well as the distance from target to film (TFD) (the sum of TOD and OFD):

   i) If the distance from the table top to a cassette placed on the floor or a stool (OFD) will be a relatively inflexible distance, performer measures this distance or reads indicator scale. (If stool is to be used, may note the table height.) Performer may adjust table height to provide for a round number for the OFD.

   ii) If the distance from the focal spot to the table top (TOD) will be the relatively inflexible distance, performer determines what this is by measuring or reading appropriate indicator scale on tube housing. Performer may adjust tube height to provide a round number for the TOD.

   iii) Depending on whether the OFD or the TOD is fixed, performer calculates the required complementary distance by referring to a magnification chart for the degree of linear magnification required, or uses the formula: degree of linear magnification equals TFD divided by TOD. For a two-times linear magnification performer simply sets the TOD equal to the OFD.

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   iv) Performer adjusts and locks the table height and/or the tube height to the calculated OFD and TOD.

c. Performer aligns the object-film and target-object distances:

   i) Performer moves the x-ray tube housing until it is centered over the table top in the approximate area where the patient's area of interest will be positioned, such as on table.

   ii) Performer swings the table out of the way so that there is no obstruction between the tube and the floor. (Does not change height.) If appropriate, places a stool on the floor under the tube. May place cassette of appropriate size on floor or stool. Performer selects the size film designated for the degree of magnification and the selected part to be studied.

   iii) Performer adjusts the collimation to correspond to the field size anticipated (for the TOD involved).

   iv) Performer activates the light in the collimator and adjusts the tube horizontally so that the light beam cast is centered to the cassette on the stool or floor. Uses the cross-hairs projected by the beam to center the tube to the area on the floor or stool.

   v) Performer locks the tube into position so that there is a 90° angle of the beam with the floor or stool. Fixes and retains collimator setting.

   vi) Performer marks the outline of the collimated light area or cassette on the floor or stool using tape or other removable marker. If not already done,

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checks by placing cassette in marked area. May mark center of area as shown by cross-hairs.

vii) Performer swings table back into place. Activates light beam in collimator and marks the table top where the center cross-hairs and light outline are projected (to be used to center the part to be radiographed). Uses tape or other radiolucent removable marker.

viii) Performer may recheck TOD and OFD to be sure that they correspond to the calculated distances.

d. For magnification technique using a vertical film holder, performer may wait until patient has been brought into examination room. Adjusts upright holder to appropriate height; adjusts x-ray tube to right-angle projection of beam to film holder; centers to the film; measures and adjusts TOD to patient's position and marks patient's position; measures and adjusts OFD from patient's position as marked.

e. If the sum of the new TOD and OFD (TFD) is now different from the TFD used for non-magnification technique, performer may consult technique chart to note the factor to use for a compensatory change in mAs. May record for later use in setting exposure factors.

f. Performer may also note the change in kVp and mAs necessary to compensate for any change in collimation from non-magnification technique. Consults appropriate charts for conversion factors. May record.

5. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

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a. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

b. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

c. Has patient assume a comfortable position seated on table or chair. If patient is in wheelchair, moves patient in chair into position next to table. If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move patient to table. With accident patient uses upright film holder with patient remaining on stretcher until injury has been localized.

d. Performer explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

e. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains when asked medical questions

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that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

f. If patient has an IV drip in place, performer checks that needle has not become dislodged and that the fluid is dripping at an even rate. If there are any problems, performer clamps tube and notifies an appropriate staff person at once.

g. If there is a wet dressing, performer has it reinforced or decides to do personally.

h. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs appropriate physician and proceeds only with approval.

i. If not already done, has patient remove dentures, hair pins, spectacles, and any jewelry from head and neck. Makes sure that all garments are removed down to below the neck.

6. Performer questions patient and/or RN or MD present on what movement is possible to determine what positions are available for use.

   a. Performer notes whether patient can be examined in the standard body positions called for with the skull projections ordered; if not, plans to substitute alternative body positions to achieve the same skull projections.

   b. If patient is an accident victim and arrives on stretcher or bed, performer plans for radiographic positioning of film and x-ray tube with patient on stretcher and without rotating head or torso. If any manipulation of patient's head is required, performer has physician carry this out.

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   c. Performer notes whether patient can assume erect seated positions for projections where this is an option. Chooses erect seated position where possible except for patient with cardiac condition or if otherwise specified.

   d. If requisition involves possible use of dental occlusal film packets such as for projections of nasal bones, maxillae and/or mandible, performer determines whether patient will be able to hold film packet in mouth or support with hands as appropriate. If not, plans to use nonscreen film or cassettes as appropriate. If occlusal film is to be used, chooses seated position if headrest is available on chair and erect position is not contraindicated.

   e. Observes whether patient is obese or has a short neck requiring special positioning or use of angle block under film. Notes whether thin patient will need padding under bony prominences.

   f. Performer considers the number and types of projections ordered for the examination and the patient's condition. Performer may consider a change from standard projections to better accomplish the purpose of the examination, or deletion of a position, or a change in technical factors. Depending on institutional arrangements, performer may obtain permission from appropriate radiologist or decides personally to alter the standard procedure.

7. Depending on whether a bucky or table top technique will be used and standard institutional practices, performer selects speed and type of film, grid, and cassette combination.

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a. Selects size(s) based on the area(s) to be included, the patient's skull size, and whether bilateral views are to be exposed on a single film.

b. For magnification technique, performer selects the size film designated for the degree of magnification and the selected area to be studied.

c. Performer makes sure that an adequate supply of loaded cassettes and/or occlusal film packets of the types and sizes selected are available in the examination room. If not, arranges to obtain or decides to obtain personally.

8. Performer prepares for the examination:

a. Performer obtains the appropriate size loaded cassette or packet for the first projection.

b. May mark midpoint of each cassette to be used for separate bilateral views. Uses radiolucent marker.

- i) For half axial oblique projection of auditory ossicles and attic-auditus-antrum areas, marks cassette or vertical film holder 1.5 inches above the midpoint.
- ii) For parieto-orbital projection of the optic foramen, superior orbital fissures and anterior clinoid processes where bilateral views are to be exposed separately, marks each half of cassette 1.5 inches lateral to the midpoint of the respective half.

c. If bilateral exposures will be made separately on one film, performer mentally decides how these will be positioned so that the film need not be turned for viewing each image. Performer uses leaded rubber sheets and masks the cassette

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completely except for the half to be exposed, Treats the half to be exposed from this point as though it were the actual film size.

d. If bilateral views are to be projected on a single film for a stereoscopic examination,performer numbers or marks cassettes so that the order of their placement and exposure will be correct.

e. If requisition calls for a facial profile study of bony and soft tissue contours, performer prepares cassette for lateral view. Then prepares a second film of the same size encased in a seamless black-paper envelope or has this done. Places loaded envelope on top of cassette and secures. Plans to expose both films simultaneously using exposure factors for lateral facial bone technique.

f. Performer attaches identification information to the cassette, occlusal film packet or table top:

- i) Places right or left marker on film holder or table-top as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.
- ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of cassette or occlusal film packet.
- iii) If patient identification information is to be entered by use of flasher, sets flashcard aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.
- iv) Performer may place patient's card into card tray for equipment using automatic film marking device.

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g. If cassette is to be used with bucky (under tabletop or in upright holder) performer may manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.

h. If a bucky is not being used, performer places cassette in a position approximating final positioning.

   i) If magnification technique is to be used, performer places cassette in marked position on floor or stool.

   ii) If appropriate to make possible minimal movement of patient, performer may place cassette in upright holder at right angles to table top or in other position selected.

   iii) With accident patient, after localization has been established, performer may obtain assistance in lifting skull so that cassette can be placed under patient.

i. Performer provides patient and everyone who will remain in room during exposure with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

9. Performer has patient assume a comfortable recumbent or seated position, depending on the positions to be employed, so that the relevant skull dimensions can be measured. Makes sure that wheelchair is in locked position if patient is to be positioned in it.

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a. If appropriate, places mattress, pillow, or clean linen on x-ray table.

b. Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way and may be collided with by patient.

c. If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.

d. With suspected fractures or accident patient, may have surgeon or radiologist position the patient.

e. Performer uses centimeter calipers to measure the thickness of the part(s) to be radiographed in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors.

f. After measuring, has patient rest in as relaxed a position as possible. May place pad, blanket or pillow under bony prominences to provide comfort.

10. Performer selects the exposure factors for the first projection by consulting the technique chart(s) posted for the machine:

   a. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other accessories (such as screens, grids, bucky, etc.).

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b. Makes note of the kVp, mA, T(seconds of exposure time), focal spot size, and the focal film distance (TFD or FFD) called for.

c. Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for a pathological condition, change in TFD, extreme fat, preference of the radiologist involved, and any other conversion needed such as with magnification technique. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate.

d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

11. Performer sets exposure factors as selected:

a. Enters control room. Makes sure that indicator light shows that x-ray generator is ready for use. Makes sure that all circuits have been stabilized.

b. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.

c. For conventional exposure control:

i) Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.

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ii) Performer selects and sets the exposure time that will produce the mAs desired.

iii) Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

d. For automatic phototimed exposure control:

i) Performer selects and sets the category corresponding to the type of study and use or nonuse of screens, bucky, etc., and, if appropriate, focal spot size.

ii) Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).

iii) May select and set a kVp range button (if called for with equipment) corresponding to range for examination.

iv) Sets a density selector corresponding to the usual (or special) requirements for the study.

v) Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.

e. Depending on the equipment, may set controls to provide for use of bucky, manual tableside adjustment of table and tube height,position, and of collimation (unless these have already been set as with magnification technique or stereo filming).

f. Performer returns to overhead unit and sets the focal-film distance (if not already done, as with magnification technique). Operates controls or manually moves the x-ray tube into place over the film holder (or at right angles to upright holder). Checks the focal-film dis-

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tance by reading indicator scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.

12. Performer prepares the part to be radiographed in the position selected for the first (or next) exposure (unless this is done by physician):

    a. May explain or demonstrate to patient what is required. May obtain help in positioning or has MD position in accident and fracture cases.
    b. If studies of the mastoid processes or half-axial projections of the auditory ossicles and attic-aditus-antrum area are requested, performer marks centering points on patient's head (as described below) and then tapes the auricles of each ear forward with a narrow strip of adhesive tape. Makes sure that tape does not extend beyond the posterior junction of the auricle and the head.
    c. Performer positions patient by first positioning body and then positioning head. In positioning body, performer proceeds as follows:

        i) For positioning patient in AP or PA supine or erect position, performer arranges body so that its median sagittal plane is centered to the midline of table or film holder.

        For lateral positioning has median sagittal plane parallel with midline. Supports any elevated parts. Has seated patients distribute weight evenly on both buttocks.
        ii) Has semiprone patient rest on forearm and flexed knee of elevated side, and supports ankles and flexed knee.
        Has prone patient flex elbows, place arms in a comfortable position. Supports ankles. Rests patient's head on forehead and nose. May have patient rest hands beneath chest.
        Has erect patient face film holder for PA projection and face away from film holder for AP projection.
        Has supine patient place arms in a comfortable position and supports ankles and knees.
        For oblique erect position adjusts body to make possible correct angulation of the head. Places arms in comfortable position.
        iii) For thin patient in recumbent lateral, PA and oblique positioning, performer may elevate chest so that the cervical vertebrae are at a correct level.
        iv) For obese patient performer uses a portable cassette holder if possible in the vertical or horizontal position to obtain a correct part-film distance without unprescribed magnification. Adjusts tube position as appropriate. If not able to achieve correct part-film distance, performer adjusts focal-film distance to compensate as described above in magnification technique. Performer positions obese patients in seated erect position when possible.
        v) With all positions arranges shoulders to lie on a single transverse plane.

    d. In positioning head, performer refers to standard reference lines. May use wax marker to draw in reference lines or points on skull or visualizes mentally. In positioning head, has patient first relax muscles of neck and then moves head gently.

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- i) Performer marks or defines the orbitomeatal line for reference by finding the line connecting the external auditory meatus and the outer canthus of the patient's eye.
- ii) Performer marks or defines the infraorbitomeatal line by finding the line connecting the external auditory meatus and the infraorbital margin. May palpate to find infraorbital margin.
- iii) Performer marks or defines the acanthiomeatal line by finding the line connecting the external auditory meatus and the acanthion.
- iv) Performer defines the median sagittal plane of the skull by referring to the sagittal line connecting nasion, acanthion and symphysis menti (mental point).
- v) Performer defines the interpupillary line by referring to the transverse line which connects the pupils of the eyes when the patient is looking straight ahead, with the nasion at its midpoint.
- vi) Performer defines the glabelloalveolar line as that connecting the most prominent point in the midsagittal plane between the eyebrows and the most prominent point in the midsagittal plane of the upper alveolus.

e. Performer immobilizes skull with a head clamp or a weighted band and rechecks angulation and position. Uses extension cone in direct contact with head when appropriate for immobilization as well as for proper collimation.

f. Performer centers part and keeps the long axis of the part parallel to the film holder. When using a bucky, centers patient to midline. With cassette on table top, centers film to part. With upright holder, adjusts height of holder to part and centers part to film. May obtain help in positioning.

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- i) In setting tube angulation performer measures the angles between the central ray and reference lines on the patient's skull, such as the orbitomeatal, infraorbitomeatal, interpupillary lines. Checks skull rotation by measuring the angle between the horizontal plane or the vertical central ray and the median sagittal line.
- ii) In centering and directing the central ray for stereoscopic examination, performer centers and adjusts the central ray at the angle as for a single plane study.
  For first exposure moves centering point the correct distance in the appropriate direction (such as lateralward or posterior); then increases or decreases the angle as appropriate. For the second exposure, removes the first cassette and replaces with a second cassette and, starting from single plane angulation, shifts centering in the opposite direction and for the same distance; changes the angulation in the opposite direction (increases or decreases). For bilateral studies on a single cassette, has the first cassette include both sides shifted in the same direction and the second cassette include both sides shifted in the opposite direction, so that each cassette has bilateral views with a common shift direction; makes a total of four exposures for each study.

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13. Performer positions as follows (unless nonconventional positioning is being used to avoid having patient move):

    a. For studies of the cranium,cranial base, sella turcica and superior orbital fissures, performer notes whether lateral-oblique and axiolateral projections are to be unilateral or bilateral, whether tangential views are involved, whether stereographic views are requested. Reviews areas of interest and required angulation.
    For bone survey, performer makes a lateral projection of the skull.
    For accident victims performer makes left and right laterals of the skull and an AP projection of the base of skull with patient on stretcher, with minimum movement of patient.

        i) For a lateral projection of the cranium, and/or sella turcica, performer has patient assume a semiprone or prone position as described, unless a seated erect lateral position is selected for obese patient, or a supine position is required for accident patient. Except for patients who cannot be moved, performer has patient turn the side of the skull to be examined to the film holder and adjusts body as appropriate so that the region of the sella turcica (coronal plane passing 3/4 inch anterior to external auditory meatus) is centered to the midline of table or film holder. Has the median sagittal plane of the head parallel with the plane of the film. Checks that the interpupillary line is at right angles to the plane of the film using a right angled object or protractor. Supports underside of jaw.

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Centers cassette at the level of the sella turcica (3/4 inch above and 3/4 inch anterior to the external auditory meatuses). For supine patients who cannot be moved, centers as above, but with reference to a cassette placed vertically. Directs central ray to the sella turcica at right angles to film and/or parallel to the interpupillary line.
For stereographic views takes first exposure with tube shifted two inches below centering point and second exposure with tube two inches above centering point. Reminds patient to retain same position for both stereo exposures.
For bilateral study performer has patient reverse position after first exposure, and sets up equipment for opposite-side lateral view. For a "spot" film of the sella turcica, performer uses extension cone to limit the field to the area of interest.

ii) For a PA projection (anterior view) of the cranium, sella turcica, and/or superior orbital fissures, performer has patient assume a prone or erect seated PA position as described, resting head on forehead and chin. For superior orbital fissures has patient rest head on forehead and nose. For superior and lateral portions of the frontal bone, has patient rest head on chin. If patient cannot be moved to a prone position, elevates supine patient on one side so that head is in lateral position with shoulder and hip supported, and uses an upright cassette holder.

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Adjusts head so that the median sagittal plane is centered to midline and at right angles to plane of film. Adjusts orbitomeatal line so that it is at right angles to the plane of the film. Supports chin. For general study centers film to the midpoint of the interpupillary line (nasion). To include vertex, shifts cassette cranially about 3 inches. For sella turcica,centers film to the glabella. For superior orbital fissures, centers film at the level of the inferior margin of the orbits. For superior and lateral portions of the frontal bone, sellar region and/or petrous pyramids, centers film to central ray.

Performer directs central ray depending on the area of interest. Refers to angulation between central ray and the orbitomeatal line rather than external perpendicular line. For a general study, directs the central ray to the midpoint of film or so as to exit at the nasion at 15° caudad. For study of frontal bone directs central ray at right angles to nasion (parallel to orbitomeatal line). For study of the superior and lateral portions of the frontal bone, directs central ray to enter near coronal suture and exit through supraorbital ridges. For study of superior orbital fissures, directs central ray through mid-orbits at 20° to 25° caudad. For study of sellar structures, directs central ray 1.5 inches above nasion at the cranial angle prescribed or directs central ray at the glabella at 10° cephalad.

Performer may use the Granger face rest for PA projection of sella turcica for seated or prone patient. If so, places cassette and face rest in position on angle block, centered to the median saggital plane of the body and close in to chest. Secures against slipping. Has patient place face on the rest with nose in opening provided and with head resting on forehead and alveolar process of the upper jaw. Checks that glabella and upper alveolus are in firm contact with face rest. Directs central ray through lower occiput to glabella at 10° cephalad.

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iii) For an AP projection (posterior view) of the cranium, performer has patient assume a supine or erect seated AP position as described, unless patient's structural difficulties make a true supine position difficult. If so, elevates recumbent patient so as to place head in a lateral position with elevated parts supported,and uses an upright cassette holder.

Adjusts patient's head with chin depressed so that its median sagittal plane is at right angles to midline of film and the orbitomeatal line is at right angles to the plane of the film. For a study of the entire occipitobasal region, centers near the level of the foramen magnum with upper margin of film at the level of the highest point of the cranial vertex. For localized projection of the dorsum sellae and petrous pyramids, centers film to central ray at about the level of the occlusal plane. For study of the posterior portion of the cranial vault, centers film to the nasium.

List Elements Fully | **List Elements Fully**

Performer directs the central ray as ordered, depending on the area of interest. Refers to angulation between central ray and the orbitomeatal line. For a general study directs the central ray through the foramen magnum at 30° caudad. For a study of the entire foramen magnum and jugular foramina, directs central ray as above at 40° to 60° caudad, depending on the flexion of the head. For study of the posterior portion of the cranial vault, directs central ray at right angles to the nasium (or parallel to orbitomeatal line).

iv) To localize lesions of the calvarium or scalp, performer adjusts patient's head so that the outer cranial table of the area of interest touches the center of the film (i.e. is tangent to center). Directs central ray at right angles to center of film.

v) For a submentovertical (underside of chin to highest point at top of cranium) projection of the full cranial base (AP), performer has patient assume a seated erect AP position if possible or a supine position with an upright bucky that can be tilted. Adjusts body in AP position as described. For seated erect patient performer places a low-back chair far enough away from the cassette holder to allow a semi-upright position with patient leaning back and resting the vertex of the skull against the film holder. For supine patient, elevates torso so that head can be extended completely with head resting on the vertex. Flexes patient's knees. Performer supports head after adjusting central ray angulation and repositions only when ready to make exposure so as to keep strain on neck to a minimum. Adjusts head so that median sagittal plane is at right angles to film and so that the infraorbitomeatal line is closely parallel to the plane of the film. Adjusts the central ray so that it is at right angles to the infraorbitomeatal line, centered to the sella turcica (coronal plane passing 3/4 inch anterior to external auditory meatuses). Centers film to central ray. Directs central ray to enter the median sagittal plane of the throat between the angles of the mandible and the sella turcica. May immobilize head with tape placed on the chin and anchored to the sides of the table or film holder.

vi) For a verticosubmental (top of cranium to underside of chin) projection of the full cranial base (PA), performer has patient assume a prone PA position as described. Has patient extend chin fully and rest head on the tip of chin, with median sagittal plane at right angles to film. Centers film to central ray. Directs central ray at right angles to the infraorbitomeatal line, directed to the sella turcica.

vii) For an axiolateral projection of the cranial base, performer has patient assume a semiprone or erect seated position as described. Has patient turn the side of the skull to be examined to the film holder in a true lateral alignment, with the median sagittal plane of the head parallel with the film.

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Centers so that the external auditory meatus is at the midline of the table,and extends head so that the infraorbitomeatal line is parallel with the transverse axis of the film. Checks that the interpupillary line is at right angles to film. Supports underside of jaw. Centers film to central ray. Directs central ray to a point on the midline one inch distal to the lower external auditory meatus at an angle 27° to 35° caudad. For a bilateral study performer has patient reverse position after the first exposure and sets up equipment for opposite side axiolateral projection similarly.

viii) For a semiaxial AP projection of the sella region and the petrous pyramids, performer notes the area of interest and angulation required. Has patient assume supine position as described. For patient who is short necked, performer may elevate cassette on an angle block directed caudally. If so, deducts the angulation of the block from the prescribed central ray angulation. Adjusts the median sagittal plane of the head to the midline of the cassette,with head flexed so that the infraorbitomeatal line is at right angles to the plane of the film. Centers film to the median sagittal plane at the level of the occlusal line. Directs the central ray to a point directly below the occlusal line. For study of the dorsum and tuberculum sellae and anterior clinoid processes,angles central ray at 30° caudad. For dorsum sellae and posterior clinoid processes angles central ray at 37° caudad.

ix) For a semiaxial PA projection of the sella turcica (dorsum sellae and posterior clinoid processes), performer has patient assume prone position as described. Centers the median sagittal plane of the head to the midline of the film holder, resting on forehead and nose. Adjusts flexion of head so that the orbitomeatal line is at right angles to plane of film. Supports chin. Centers film at a point about 1.5 inches above the nasion. Directs central ray to enter at a point 1.5 inches below the inion (external occipital protruberence) at an angle 25° cephalad, to exit about 1.5 inch above the nasion.

x) For an occipito-frontal (PA) projection of the cranium, sella turcica and ear, performer notes the areas of interest so as to choose correct reference line for positioning patient and centering central ray and film. Has patient assume prone or erect seated PA position as described. With prone position elevates thorax. Performer has patient rest head on the upper frontal region so that the median sagittal plane is at right angles to film. Performer uses triangle or protractor to adjust flexion of head. For demonstration of dorsum sellae and/or internal auditory canals and labyrinths of the ears, performer adjusts head so that infraorbitomeatal line forms an angle of 50 degrees to the plane of the film. For demonstration of the external auditory canals, tympanic cavities and bony part of eustachian tubes, performer adjusts head so that orbitomeatal line forms an angle of 50 degrees to the plane of the film.

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Performer centers film based on the area of interest. Centers film at the level of the external auditory canals for demonstration of sella turcica; one inch above for inclusion of the vertex. For projection of dorsum sellae, centers to a point .5 cm. distal to the nasion. For projection of the petrosae, centers to the foramen magnum. Directs central ray at right angles to the midpoint of film as centered.

b. For studies of the optic foramen, sphenoid strut, orbital fissures, and anterior clinoid process, performer reviews purpose of examination, whether bilateral views are ordered, special localizing equipment needed, and marks cassette for centering if appropriate.

i) For a parieto-orbital projection (cross section view) of the optic foramen, performer plans for bilateral views on a single film. Has patient assume a PA position, erect or prone, as described. Supports feet of recumbent patient. Has patient rest head on the zygoma, nose and chin of the side of interest. Adjusts flexion so that the acanthiomeatal line is at right angles to the plane of the film and the rotation so that the median sagittal plane of the head is at a 53° angle with the plane of the film. Centers the orbit on the side of interest to the midpoint of the unmasked half of the film. Directs the central ray at right angles to the midpoint of the film. After first exposure, performer has patient reverse position of head and sets up similarly for exposure of opposite side.

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If using the Pfeiffer or similar optic canal localization device, performer positions device near to and parallel with the side edge of the table for erect patient or end of table for prone patient with support in the apex of the "V." Has patient place head in the apparatus with chin resting on support in the apex of the "V." Adjusts head so that median sagittal plane of the skull is vertical. Adjusts head with eyes open so that outer canthi overlie marks on the device and so that orbitomeatal lines form a 30° angle with vertical lines on the cassette tunnel surfaces of the device. Supports head with forehead rest. Directs central ray on first side at 37° towards its respective cassette tunnel (at right angles to the plane of the tunnel), centered to cross mark on tunnel. Centers unmasked portion of cassette in tunnel. After making first exposure has patient retain position while performer removes cassette and places cassette for exposure of other side in other tunnel. Directs central ray similarly on other side. Performer makes stereo exposures for one side using two cassettes masked for bilateral study as described. For first exposure shifts 1.25 inches cranially; for second exposure (of same side, on second cassette) shifts 1.25 inches caudally. Shifts similarly for third and fourth exposures of the opposite side.

ii) For an orbitoparietal projection (cross section view) of the optic foramen, performer plans for bilateral views on a

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single film. Has patient assume a supine position as described. If performer will work without an angle block, performer rotates the head to the side of interest so that the median sagittal plane of the head is at a 50° angle with [illegible] plane of the film. Adjusts extension so that the acanthiomeatal line is at right angles to the plane of the film. If performer will work with an angle block, elevates shoulders and adjusts a 15° angle block under the head so that the angle is directed cranially. Adjusts head so that the median sagittal plane is at a 40° angle with the plane of the film and the acanthiomeatal line is at right angles to plane of film. Performer centers unmasked half of the film to the uppermost orbit. Directs the central ray at right angles to the midpoint of the film, entering at the lower outer margin of the uppermost orbit. After first exposure, performer has patient reverse position of head and sets up similarly for exposure of opposite side.

iii) For a parieto-orbital projection of the sphenoid strut, performer may plan for bilateral views on a single film. Has patient assume a PA position, erect or prone, as described in (i), above. Has patient rest head on the superciliary arch and the side of the nose of the side of interest. Adjusts extension so that the infraorbitomeatal line is at right angles to the plane of the film, and rotation so that the median sagittal plane is at 20° towards the film on the side of interest. Centers the orbit on the side of interest to the midpoint of the

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unmasked half of the film. Directs the central ray to the midpoint of the film at 7° caudad, passing through the center of the orbit. After first exposure, performer has patient reverse position of head and sets up similarly for exposure of opposite side.

iv) For an orbitoparietal projection of the sphenoid strut, performer has patient assume a supine position as described in (ii), above. Rotates head to the side of interest and adjusts flexion so that the infraorbitomeatal line is at right angles to the plane of the film and the median sagittal plane is at 19° toward the film on the side of interest. Centers film to the uppermost orbit and directs the central ray to the midpoint of the film at 7° cephalad, passing through the center of the orbit.

v) For a PA projection (anterior view) of the inferior orbital fissures, performer has patient assume prone position as described, with head resting on forehead and nose. Adjusts head so that its median sagittal plane is centered and at right angles to the midline of the film holder. Adjusts flexion so that the infraorbitomeatal line is at right angles to the plane of the film. May elevate forehead to achieve this. Centers film to the central ray. Directs central ray to the nasion at 20° to 25° cephalad.

vi) For a parieto-orbital projection (at eccentric angle) of the optic foramen, superior orbital fissures and anterior clinoid processes, performer reviews

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area of interest. Prepares cassette for bilateral views on a single cassette (if not already done) by marking each side as described. Performer has patient assume a prone position as described,with head resting on forehead and nose. Adjusts head so that median sagittal plane is at right angles to film holder and orbitomeatal line is at right angles to the plane of the film; may elevate forehead to achieve this. For each exposure, centers the unmasked half of the cassette so that the adjacent orbit on that side coincides with the mark on that side of the cassette. For study of the optic foramen and/or anterior clinoid process,directs central ray to the midpoint of the unmasked half of the film at an eccentric angle 20° caudad and laterally at 20°. For study of the superior orbital fissure and/or anterior clinoid process,directs central ray to the midpoint of the unmasked half of the film at an eccentric angle 30° caudad and laterally at 20°. Instructs patient to retain position after first exposure; centers second half of film to the opposite side and directs central ray as above, on opposite side.

c. For studies of the mastoid processes of the temporal bones, performer notes whether bilateral, stereographic and/or tangential studies are requested. Reviews areas of interest, whether special localizing devices are needed, and marks patient and cassettes for centering as appropriate. Notes whether part-angulation or central ray angulation methods are requested.

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If request is for bilateral stereo exposures,performer makes posterior shift for exposures one and three on the same cassette, showing the two sides; makes the anterior shift for exposures two and four, on the second cassette, also representing the two sides. Increases central ray angulation by 3° for posterior shifts and decreases by 3° for the anterior shifts.

For centering mastoid processes performer marks a point on either side of head. For lateral views marks a point one inch directly backward from the center of each external auditory meatus. For tangential projections marks a point one inch above the palpable tip of each mastoid process. For semiaxial lateral projections marks a point at the junction of the auricle and the head immediately behind each external auditory meatus. Uses marking pen or wax pencil. If not already done, tapes each auricle forward as described.

i) For lateral projection of mastoid process, performer notes whether part angulation or central ray angulation method is t be used or a special localization device. Has patient assume PA position, prone or seated, as described,resting head on the side of interest.

For part-angulation or central ray angulation method centers the localization mark on head to the center of the unmasked portion of the film holder. For part-angulation method has patient rest head on the flat surface of the cheek. Adjusts head

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so that median sagittal plane is at a 15° forward angle and at 15° caudad. Directs central ray at right angles to the midpoint of the unmasked area of film.

For central ray angulation method, adjusts head in lateral position so that infraorbitomeatal line is parallel with transverse axis of film, median sagittal plane is parallel with plane of film, and interpupillary line is at right angles to plane of film. For recumbent patient raises and props opposite shoulder and supports underside of jaw. Directs central ray to midpoint at an angle 15° caudad and 15° towards the face. In both methods central ray enters about 2 inches posterior to, and 2 inches above the uppermost external auditory meatus. After first exposure has patient turn to opposite side; centers other half of cassette and sets up similarly for opposite side.

If using Granger mastoid localizer, performer adjusts angle block to an angle 15° caudad and 15° towards the face. Places headrest and cassette in position and immobilizes block. Has patient rest head in lateral position on side of interest through opening,while in prone or seated position. Adjusts head so that its median sagittal plane is parallel with plane of film, with glabella and upper alveolus in firm contact with inner surface of localizer plate. Adjusts height of crossbar so that side of nose rests against it. Directs central ray at right angles to midpoint of film as described above. For second exposure reverses the transverse inclination of block and position of headrest. For stereoscopic projections directs central ray 3° anteriorly for posterior tube shift and 3° posteriorly for anterior tube shift.

If using the Bullitt mastoid device, has patient assume supine position with occiput lying on headrest between the vertical plates of the device. Adjusts body and headrest so that the two localization marks on head are centered to the intersection of the crosslines of the inserts. Adjusts head so that median sagittal plane and infraorbitomeatal lines are at right angles to plane of film. Immobilizes head with upright plates. (Tube angulation is automatic.) Uses cassette holders adjacent to right mastoid for exposures one and two in appropriate positions for single plane or stereo views, and holder adjacent to left mastoid for exposures three and four,so that the posterior tube shift projection of each mastoid is made on a single cassette, and,for stereoscopic views, the anterior tube shift projection of each mastoid is made on a second cassette. Maintains patient in same position for all four exposures.

ii) For posterior tangential projection (anterior tangential view) of mastoid process, performer has patient assume prone (PA) position for part-angulation or seated PA position for central ray angulation method. For prone patient places cassette on a 15° block angled cranially,and adjusts and immobilizes under pa-

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tient's head. For erect, seated patient, positions cassette in vertical film holder.

Has prone patient rest head on cheek of side of interest and centers localization point to center of unmasked half of film. Adjusts head so that infraorbitomeatal line is at right angles to plane of film and so that median sagittal plane forms an angle of 55° with the plane of film. Directs central ray at right angles to midpoint of unmasked half of film.

For seated patient centers and positions head as above, but directs central ray 15° cephalad. For either prone or seated patient directs central ray to enter the posterior border of the mastoid process at the junction of the auricle of the ear and the head. After first exposure has patient reverse head position for view of other side, and sets up similarly.

iii) For anterior tangential projection (posterior tangential view) of mastoid process, performer has patient assume supine AP position for part-angulation, or seated AP position for central ray angulation method (with cassette vertical). For supine patient places cassette on a 15° block angled caudally, and adjusts and immobilizes under patient's head.

Centers cassette to the median sagittal plane of the head at the level of the localization points. Rotates head toward the side of interest so that localization spot is centered to the midpoint of unmasked half of cassette. Adjusts head so that the median sagittal plane forms an angle of 55° with the plane of the film (with head rotated away from the side of interest to achieve angle) and with infraorbitomeatal line at right angles to plane of film. For supine patient directs central ray at right angles to midpoint of unmasked half of film. For seated patient directs central ray at 15° caudad. For either supine or seated patient directs central ray so as to enter the anterior border of the mastoid process at the junction of the auricle of the ear and head. Proceeds similarly with exposure of other side.

iv) For semi-axial lateral projections of the mastoid and petrous regions, performer reviews orders on area of interest or central ray angulation. Positions patient in prone PA position with shoulder opposite side of interest raised and propped, or seated in PA position before vertical cassette holder as described. Adjusts patient's head in lateral position on side of interest, centered to localization point, with point 3/4 inch above midpoint of unmasked half of film. Adjusts head so that median sagittal plane is parallel with plane of film and interpupillary line is at right angles with plane of film. Adjusts flexion so that the infraorbitomeatal line is parallel with the transverse axis of the film. For demonstration of the pneumatic structure of mastoid process, mastoid antrum, tegman tympani, internal and external acoustic meatuses, sinus, dural plates and mastoid emissary

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vessel, performer directs central ray to exit at the external auditory meatus on the side of interest at an angle of 25° caudad. Adjusts angulation to 15° caudad for mastoid cells,mastoid antrum, internal and external auditory meatuses and tegmen tympani; and to 35° caudad for mastoid cells, mastoid antrum, external acoustic meatus, tegmen tympani, labyrinthal area, and carotid canal. If the petrous apex between the anterior wall of the external acoustic meatus and the mandibular condyle is area of interest, has patient open mouth for exposure and directs central ray at 35° caudad.

d. For studies of the petrous portions of the temporal bones, performer notes whether request involves separate projections of each side for frontal studies. Reviews areas of interest.
For profile projections of the petrous portions, performer marks each cheek at a point one inch directly forward from (anterior to) the external auditory meatus. For parieto-temporal (profile) projections of the petrous portions, performer marks each cheek at a point 1.5 inches forward from the external auditory meatus. For demonstration of fractures of the labyrinth, performer marks a point one inch medial to the external auditory meatus on the side of interest.
For half-axial oblique projection of the auditory ossicles and attic-aditus-antrum areas, performer marks a point at the junction of the auricle and the head immediately behind each external auditory meatus.

i) For posterior profile projection (anterior profile view) of petrous portion, performer plans on separate bilateral exposures on one film. Has patient assume a prone or seated PA position as described, with cassette placed horizontally or vertically as appropriate. Has patient place or rest head on forehead, nose and zygoma on affected side, and centers the unmasked half of the cassette to the localization point marked on cheek. Adjusts flexion so that the infraorbitomeatal line is parallel with the transverse axis of the film, and rotation so that the median sagittal plane forms a 40° angle with the plane of the film. Directs central ray to midpoint of film at 12° cephalad. After first exposure has patient reverse position of head;centers other side of cassette, and sets up similarly.

ii) For anterior profile projection (posterior profile view) of petrous portion, performer plans on separate bilateral exposures on one film. Has patient assume a supine or seated AP position as described, with affected side of head resting on or placed against film holder. Rotates head away from the side of interest so that median sagittal plane forms a 45° angle with the plane of film;adjusts flexion so that infraorbitomeatal line is parallel with the transverse axis of film.Centers unmasked half of film directly below localization point. Directs central ray to midpoint of film at 10° caudad,entering about 3/4 inch above the opposite side localization mark. After first exposure has patient reverse position of head; centers other

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side of cassette and sets up similarly.

iii) For parietotemporal projections (profile views) of petrous portion, performer plans on separate bilateral exposures on one film. Has patient assume semiprone position as described. If central ray angulation method is to be used, has patient rest head in lateral position on the side of interest, and centers to midpoint of unmasked half of film using localization mark. Adjusts flexion so that the infraorbitomeatal line is parallel with the transverse axis of film. Checks that median sagittal plane is parallel to plane of film, and interpupillary line is at right angles to plane of film. Supports jaw. Directs central ray to midpoint of unmasked half of film anteriorly (towards the face) at 33°, and at 10° cephalad.

If requested, performer may have semiprone patient rest head on temple. Centers localization point on side of interest to midpoint of unmasked half of film. Adjusts flexion so that the infraorbitomeatal line is at a cranial angle of 5° to the transverse axis of the film. Adjusts rotation so that median sagittal plane forms an angle of 15° with the plane of film. Directs central ray to midpoint of film at anterior angle of 30°.
After first exposure has patient reverse position of head; centers other side of cassette and sets up similarly.

iv) For AP semi-axial projection (posterior semi-axial view) of petrous portions, performer has patient assume supine or seated AP position as described. Adjusts patient's head so that median sagittal plane is at right angles to film. If possible, flexes head so that the orbitomeatal line is at right angles to plane of film. Otherwise adjusts so that infraorbitomeatal line is at right angles to plane of film. Centers film to the central ray if both sides are to be projected on a single exposure. If each side is to be projected separately, centers to the level of the median side of the outer third of the orbit on the side of interest. For simultaneous bilateral projection, if orbitomeatal line is at right angles, directs central ray to the intersection of the median sagittal plane of the head and a transverse line connecting the external auditory meatuses, at 30° caudad. If infraorbitomeatal line is at right angles, directs central ray as above at 37° caudad. For unilateral projections, angles central ray as above, but directs central ray to intersection with the appropriate transverse line. For separate exposures has patient retain position after first exposure and centers opposite side of cassette and central ray to other side.

v) For PA semi-axial projection (anterior semi-axial view) of petrous portions, performer has patient assume a prone PA position as described. Has patient rest head on forehead and nose so that median sagittal plane is at right angles to midline. Adjusts flexion so that orbitomeatal line is at right angles to plane of film. Centers cassette to a point about one inch above nasion. Directs central

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ray to exit through nasion at 25° cephalad.

vi) For occipitofrontal projection of petrous portions,performer reviews area of interest. Has patient assume seated PA position or has patient assume prone position as described,with thorax elevated. Has patient rest head on the upper frontal region,and adjusts so that median sagittal plane is at right angles and centered to midline of film holder. For labyrinth and internal auditory canal, adjusts flexion so that infraorbitomeatal line is at 50° with plane of film. For external auditory canals, tympanic cavities and bony part of the eustachian tubes,adjusts flexion so that orbitomeatal line is at 50° with plane of film. Centers film to midpoint at or above the level of the external auditory meatuses. Directs central ray at right angles through the foramen magnum or to the midpoint.

vii) For subbasal submentovertical (AP) projections of petrous portions,performer reviews central ray angulation, whether full extension of the head is requested or possible, and whether the two sides are to be projected separately. Has patient assume seated or supine AP position as described. For supine patient elevates trunk. Has patient rest head on the vertex, just anterior to the lamda,and adjusts so that median sagittal plane is at right angles and centered to the midline of the film holder. If possible, adjusts extension so that orbitomeatal line is parallel with plane of film; otherwise adjusts flexion so that supraorbitomeatal line is parallel with plane of film.

If both sides are to be projected on one exposure, centers film or unmasked half to central ray. For unilateral projection centers at a level just medial to the tip of the mastoid process.

For full extension position directs central ray at right angles to orbitomeatal line at center of the line connecting the external auditory meatuses. May direct central ray one inch anterior to this point at anterior angle of 5°.

If full extension was not achieved, directs central ray to the point one inch anterior to center of line connecting auditory meatuses, but at anterior angle of 15° to 20°. For separate exposures has patient retain position; centers other side of cassette to opposite side and sets up similarly.

viii) For subbasal verticosubmental (PA) projection of petrous portions,performer adjusts cassette on 23° angle block directed caudally,and supports. May elevate cassette and angle block and then immobilize. Has patient assume seated or prone PA position with median sagittal plane of head centered to midline. Has patient extend head as far as possible and rest chin near top of cassette. Adjusts so that median sagittal plane is vertical. Directs central ray at 15° to 20° to the orbitomeatal line along a line passing immediately anterior to the tragus and immediately posterior to the angle of the jaw.

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ix) For half-axial oblique projection of the auditory ossicles and attic-aditus-antrum areas, performer uses premarked centering points on patient, cassette and vertical holder. Reviews the central ray and skull angulation ordered. Performer seats patient laterally before a vertical film holder or has patient assume supine position as described; may elevate and support outer side of cassette for close part-film contact. Places ear on the side of interest adjacent to film and centers mark on cassette or holder to localization point behind auricle. Depresses chin so that mastoid process is in contact with film and infraorbitomeatal line is parallel with transverse axis of film. Performer rotates head so that its median sagittal plane is at a 45° angle with the plane of the film (or at the angulation ordered). Directs the central ray to exit through the external auditory meatus at 45° caudad (or at the angulation ordered). After first exposure has patient reverse position of head. Centers second premarked cassette to other side and sets up similarly.

x) For slightly oblique projections of the attic-aditus-antral areas, performer has patient assume seated or supine AP position as described. If central ray angulation technique will be used, adjusts head so that median sagittal plane of head and orbitomeatal line are both at right angles to plane of film. Centers film to a point 3/4 inch distal to tragus. Directs central ray through middle ear at 20° caudad and at a medial angle of 10° to 20°.

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If rotation and flexion will be used, centers side of interest so that a point one inch medial to the tragus is at the midline. Rotates head away from affected side so that median sagittal plane is at 80° to 90° with plane of film. Adjusts flexion so that orbitomeatal line is parallel with transverse axis of film. Directs central ray to a point midway between outer margin of orbit and tragus at 20° caudad.

If a wedge angle, flexion, and rotation will be used, adjusts patient in supine position with head on wedge block that is at a 30° caudal inclination. Rotates head away from affected side so that median sagittal plane is at 88° to 92° with the horizontal. Adjusts flexion so that infraorbitomeatal line forms a 30° caudal angle with the vertical. Directs central ray at right angles to the midpoint, entering slightly above, and lateral to, the superolateral margin of the orbit. After first exposure has patient reverse position of head. Centers opposite side of cassette or second cassette to other side and sets up similarly.

xi) For demonstration of fractures of the labyrinth, performer plans on five projections in AP or PA position. If PA projections are ordered, has patient assume prone or seated PA position as described. Performer places cassette tunnel under head or has head rest against cassette tunnel adjusted to a 12° cranial angulation. Adjusts head so that median sagittal plane is at a 45° angle with

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the plane of the film. Centers localization mark to the midpoint of film with forehead, nose and zygoma resting against tunnel on side of interest. Adjusts head so that infraorbitomeatal line is parallel with the transverse axis of the film.

If AP projections are ordered, has patient assume supine or seated AP position as described. Places cassette tunnel under or beside head at 12° caudal angulation. Rotates head away from the side being examined so that median sagittal plane is at an angle of 45° with the plane of the film. Centers to localization mark and adjusts angle of infraorbitomeatal line as above. Centers central ray to the midpoint of film for all five projections and adjusts central ray angulation as follows. First: at right angles to film. Second: from right side at a 6° transverse angle. Third: from right side at a 12° transverse angle. Fourth: from left side at a 6° transverse angle. Fifth: from left side at a 12° transverse angle. Reminds patient to retain position for each exposure. Changes and identifies cassettes and adjusts central ray angulation after each exposure. If bilateral study is ordered, repeats entire set-up with head rotated in opposite direction and cassette tunnel arranged on opposite side.

e. For studies of the styloid processes of the temporal bones, performer notes whether bilateral study is ordered. For oblique AP projection of the temporal styloid processes, performer marks two points on the patient's posterior neck surface

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one inch lateral on either side of the median sagittal plane at the level of the mastoid tip.

i) For AP projection (posterior view) of temporal styloid processes, performer has patient assume a supine AP position as described. Adjusts a 13° angle block under head, directed caudally, and places cassette on block. Centers film to the median sagittal plane of the head at the level of the external auditory meatuses, and immobilizes block. Adjusts head so that median sagittal plane is at right angles to the horizontal, with acanthiomeatal line at right angles to the plane of the film.

Immobilizes head and has patient open mouth wide. Checks that acanthiomeatal line is still at right angles to film. Notes whether patient can immobilize mouth in open position by phonating the sound "ah-h." If not, performer selects a cork of appropriate size and has patient grasp it between teeth. Rechecks acanthiomeatal line.

Directs central ray at right angles to the horizontal at the midpoint, between the floors of the external auditory meatuses.

If an angle block is not used, adjusts median sagittal plane of head and acanthiomeatal line at right angles to cassette, or one inch proximal to the tip of the mastoid processes. Centers as above. Directs central ray to film at an angle defined by the infraorbitomeatal line.

ii) For oblique AP projection (oblique posterior view) of the

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temporal styloid processes, performer plans on bilateral views. Has patient assume supine AP position as described. Rests patient's head on the occiput. Centers localizing mark on the side of interest to the midline of film or unmasked half of cassette. Rotates head towards the side being examined so that median sagittal plane is at 88° with the plane of the film. Extends head so that the occlusal plane of the upper teeth is at right angles with plane of film. Performer has patient open mouth and phonate, or uses cork as described in (i), above, and rechecks angulation of head. Directs central ray at an 8° cranial angle along a line passing about 1/4 inch distal to the tip of the mastoid process on the side of interest.

After first exposure has patient rotate head for view of other side; uses unmasked side of cassette or second cassette and sets up similarly.

iii) For lateral projection of temporal styloid processes, performer has patient assume a semiprone or prone position as described, with head resting in a lateral position on the side of interest. Centers the floor of the external auditory meatus to midpoint of unmasked half of film. Adjusts head so that median sagittal plane is parallel with plane of film, and interpupillary line is at right angles to plane of film. Adjusts flexion so that acanthiomeatal line is parallel with transverse axis of film. Has patient open mouth and phonate or uses cork as described in (i), above, and rechecks angulation of head. Directs central ray to midpoint of film at an angle 10° cephalad and 10° anterior (toward the face).

After first exposure has patient rest head on opposite side and sets up similarly.

iv) For semiaxial PA projection (semiaxial anterior view) of temporal styloid processes, performer has patient assume a prone PA position as described, with head resting on forehead and nose. Adjusts head so that median sagittal plane is at right angles to midline. Adjusts flexion so that orbitomeatal line is at right angles to plane of film. Centers film at, or one inch proximal to, nasion. Directs central ray to the nasion at 25° cephalad.

f. For studies of the occipital bone, including the jugular foramina and hypoglossal canals, notes whether bilateral views are ordered. For anterior profile projection of hypoglossal canal, marks a point on each cheek one inch forward from and .5 inch below the level of the external auditory meatus.

i) For subbasal projection (AP) of the jugular foramina, performer has patient assume an erect seated AP position as described, or elevates trunk of a patient in the supine AP position. Notes whether central ray or part angulation has been ordered. Positions patient with head resting on vertex.

If central ray will enter at right angles, adjusts head so that median sagittal plane of head is centered to midline and at right angles to film. Adjusts head so that orbitomeatal line is at a 25° angle with the plane of the film.

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Centers film just distal to the level of the external auditory meatuses. Directs central ray at right angles to the midpoint, centering about 2 cm. distal to the mandibular symphysis. If patient's jaw is judged prominent, directs central ray caudally from 5° to 10°.

If central ray angulation has been ordered, adjusts median sagittal plane as above, but has orbitomeatal line parallel with plane of film. Centers film to central ray; and directs central ray one inch distal to the mandibular symphysis at 20° caudad.

ii) For transoral projection (AP) of the jugular foramina, has patient assume AP position as described. If patient is short-necked, elevates shoulders. Rotates patient's head toward the side of interest so that the median sagittal plane forms an 80° angle with the plane of the film. Centers inner canthus of the side of interest to the midline. Adjusts extension so that acanthiomeatal line is at a cranial angle of 10° with the vertical. Immobilizes head and has patient open mouth wide. Checks that head angles are still correct. Notes whether patient can immobilize mouth in open position and phonate the sound "ah-h." If not, performer selects a cork of appropriate size and has patient grasp it between teeth. Rechecks position. Directs central ray through the open mouth at 25° cephalad. If bilateral views are ordered, performer rotates patient's head as appropriate in the other direction after the first exposure, and sets up similarly.

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iii) For transmandibular projection (AP) of the jugular foramina, performer has patient lie in supine position as described, and elevates trunk so that patient can rest head on vertex just anterior to the lambda. Rotates patient's head away from the side being examined so that median sagittal plane of head is at a 70° to 75° angle with the plane of film. Extends head so that infraorbitomeatal line is at a cranial angle of 25° with the vertical. Centers lateral margin of orbit and mandibular ramus of the upper side to the midline, and centers film to a level just distal to the external auditory meatus. Directs central ray at right angles to the mid-area of the upper mandibular ramus. After first exposure, rotates head in opposite direction and sets up similarly.

iv) For anterior (AP) profile projection (posterior profile view) of the hypoglossal canals (anterior condyloid foramen), performer places patient in seated or supine AP position as described. Rotates head away from the side of interest so that the median sagittal plane of head is at 45° with the plane of the film. Centers localization mark to midline, and film 3/4 inch below localization mark. Has patient open mouth as wide as possible and phonate or uses cork as described in (ii), above. Adjusts so that the infraorbitomeatal line is parallel with the transverse axis of the film. Directs central ray to the localization point at 12° caudad. After first exposure reverses rotation and sets up similarly.

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g. For studies of the facial bones, notes whether stereoscopic views are ordered. If so, plans to employ longitudinal tube shifts.
For radiographic demonstration of blowout fractures performer makes views with patient in "Waters" PA (parietoacanthial) position. For accident patients makes view with patient in parietoacanthial position and makes lateral views, adapting positioning so as to require no movement of the patient from the supine position.
If a profile study of bony and soft tissue contours has been ordered, uses double film set-up (film in envelope placed over loaded cassette).

i) For lateral projection of the facial bones, performer notes whether stereoscopic projections are ordered, bilateral views, and whether a facial profile showing the relationship of the bony and soft tissue contours is requested. Performer has patient assume a semiprone position on table, or seated obliquely, or in PA position before a vertical cassette holder, as described. For stretcher patients maintains patient in supine position and adjusts cassette in vertical holder, with x-ray tube set for horizontal filming across stretcher.

Adjusts patient's head so that the median sagittal plane is parallel with plane of film. For facial profile has patient's head rest against film holder in lateral position after the two-film set-up has been put into place, with film in envelope holder on top of film in cassette. Centers zygoma to the midline at center of film. For facial profile centers canine fossa to midpoint. Adjusts flexion so that the infraorbitomeatal line is parallel with transverse axis of film, and rotation so that interpupillary line is at right angles to the plane of the film. Supports jaw if patient is recumbent. Directs central ray at right angles to the midpoint of the film. For stereography makes the appropriate longitudinal tube shift. If bilateral views have been ordered, performer sets up similarly for opposite side after first exposure of the side of interest.

ii) For parietoacanthial projection (oblique frontal view in "Waters" position) of the facial bones, performer has patient assume a prone or seated PA position as described. For stretcher patients, adjusts patient in supine position; positions x-ray tube under the stretcher; and adjusts the cassette holder so that film can be placed over the patient's face in a horizontal plane. Has patient in PA position rest tip of extended chin against film. For supine patient, supports shoulders and neck so that head drops naturally back, and lowers cassette so that it touches patient's chin. Centers median sagittal plane of head to midline of film. Adjusts flexion so that orbitomeatal line is at 40° angle with the plane of the film, and rotation so that median sagittal plane is at right angles with plane of film. Directs central ray at right angles to midpoint of film.

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iii) For oblique projection of facial bones, performer reviews angulation and notes whether stereoscopic views are ordered. Has patient assume semiprone or seated position as described. Has patient rest head on cassette, on the zygoma, nose, and chin, with the orbit of interest centered to the midline at the level of the infraorbital margin. Adjusts flexion of head so that acanthiomeatal line is parallel with transverse axis of film; adjusts rotation so that median sagittal plane of head is at a 53° angle with plane of film. Directs central ray to midpoint of film at right angles or 10° to 15° cephalad, as ordered. Shifts tube as appropriate for stereoscopy. When first exposure has been made, rotates head to other side and sets up similarly.

iv) For inferosuperior oblique projection (superoinferior oblique view) of facial bones, has patient lie in semiprone position as described, with the side of interest uppermost. Extends the head and rests it on nose, zygoma and chin. Centers the film so that orbit of the side next to the table is at the midpoint, with the midpoint of film about two inches above the floor of the antrum on the side next to film. Directs central ray to the lower antrum at 25° to 30° cephalad, to enter neck just behind the angle of the jaw. If bilateral views are ordered, reverses sides and proceeds similarly after first exposure.

h. For studies of the zygomatic arches, performer notes whether bilateral views are requested. Reviews areas of interest.

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i) For oblique lateral projections of zygomatic arches, performer has patient assume a seated or recumbent lateral position as described. Depresses shoulder on the side next to film. Has patient rest parietal region of head against cassette on the side of interest, and adjusts so that head is in lateral position, median sagittal plane forms 30° longitudinal angle with plane of film, and is parallel with the transverse plane of the film. Centers unmasked half of film to the zygoma on the side next to the film. Immobilizes head and has patient open mouth wide. Notes whether patient can immobilize mouth in open position by phonating the sound "ah-h." If not, performer selects a cork of appropriate size and has patient grasp it between teeth and hold breath during exposure. Rechecks angulation. Directs central ray at 7° to 8° cephalad, so that it enters just below the mandibular angle on the side away from film, emerging at the lower temporomandibular joint on the opposite side. After first exposure centers other side of film to patient's opposite side and sets up similarly.

ii) For semiaxial (PA) projection (inferosuperior view) of zygomatic arches, performer places film horizontally or inclines film in cassette holder on a block angled 23° caudad. Has patient assume prone PA or seated position as described, with head resting on nose and chin, and with tip of chin centered to the midpoint of film. Adjusts

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median sagittal plane of head so that it is at right angles to plane of film.

If patient is resting on horizontally place film, directs central ray to midpoint at 23° caudad, entering the vertex midway between the zygomatic arches. If patient is resting on caudally inclined film holder, directs central ray at right angles to midpoint of film or at 10° to 15° caudad.

iii) For semiaxial oblique(PA)projection (tangential view) of zygomatic arches, performer notes whether an angle block will be used. Adjusts patient in prone or seated PA position for positioning head on horizontally placed or caudally inclined cassette, as described.

For horizontal cassette placement,has patient extend head and rest on chin. Rotates head away from the side of interest so that the median sagittal plane is at a 75° angle with the plane of the film. Extends head so that the infraorbitomeatal line is as parallel to plane of film as possible. Centers unmasked half of film to a point 3 inches distal to the most prominent point of the zygoma of the upper side. Supports cheek. Directs central ray at right angles to the infraorbitomeatal line,directed through the zygomatic arch at a point about 1.5 inches posterior to the outer canthus.

For angle block positioning,performer adjusts cassette on 35° block placed at a caudal angle. Has patient rest cheek of unaffected side on cassette,and centers as above. Adjusts flexion so that acanthiomeatal line is at right angles to the plane of the film,and rotation (away from side of interest) so that median sagittal plane is at 45° angle with plane of film. Directs central ray at right angles to midpoint of film, entering the most prominent point of the upper zygoma.

After first exposure centers other side of film to opposite side and sets up similarly.

iv) For semiaxial AP projection (symmetrical posterior view) of zygomatic arches, performer notes whether cassette will be used horizontally or inclined caudally. Adjusts patient in supine AP position as described. For horizontal cassette centers film to the level of the mandibular angles,with median sagittal plane at midline. For angled cassette adjusts so that film is at a 30° caudal angle, and centers to median sagittal plane at a point about 2 inches distal to external auditory meatuses.

Has median sagittal plane at right angles to plane of film and head flexed so that orbitomeatal line is at right angles to plane of film. Directs central ray at 30° caudad for horizontal cassette and at right angles to the horizontal plane with angled cassette, directed to the glabella.

v) For submentovertical (AP) axial projection (symmetrical axial view) of zygomatic arches, performer adjusts patient in seated or supine AP position as described, with supine trunk elevated. Has patient rest head

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on vertex, and extends so that infraorbitomeatal line is as nearly parallel with plane of film as possible. Adjusts so that median sagittal plane is at right angles to film. Applies tape to inferior surface of chin and draws towards top of head in line with median sagittal plane. Anchors to edge of table or cassette holder. Centers film to central ray. Directs central ray at right angles to infraorbitomeatal line midway between zygomatic arches, passing through a coronal plane lying about one inch posterior to outer canthi.

For mento-frontal projection adjusts patient in AP supine position and places cassette in vertical position behind head, angled away from patient at 80° with the horizontal plane. Hyperextends neck; supports; and directs central ray at right angles to infraorbitomeatal line, centered beneath the mandibular symphysis.

vi) For oblique axial (AP) projection of zygomatic arches, performer has patient assume a supine or seated AP position as described with supine trunk elevated. Has patient extend head and rest it on vertex so that the infraorbitomeatal line is parallel with the plane of the film. Elevates cassette if patient is supine to accomplish this. Rotates head towards the side of interest so that the median sagittal plane is at a 75° angle with the plane of the film. Centers unmasked half of film to the zygomatic arch or to the central ray. Tapes head as described in (v), above. Directs central ray at right angles to the infraorbitomeatal line directed to the zygomatic arch. After first exposure rotates head to opposite side; centers other half of film, and sets up similarly.

vii) For transoral axial projection (oblique axial AP view) of zygomatic arches, performer adjusts patient in AP supine position as described, with trunk elevated, head resting on vertex, and infraorbitomeatal line parallel with plane of film; may elevate cassette if needed. Centers unmasked half of film to a point two inches lateral to the zygoma on the side of interest. Adjusts so that median sagittal plane of head is at right angles to plane of film. Adjusts central ray at right angles to plane of film and then at lateral angle of 25° to enter the midpoint of the adjacent mandibular body. Performer has patient open mouth and phonate or uses cork as described in (i), above; rechecks angulation of head and central ray so that, with mouth open, the central ray passes through the zygoma. After first exposure has patient maintain position. Centers other half of film to opposite side and angulation to 25° in opposite lateral direction.

i. For studies of the nasal bones, performer notes whether occlusal film packets or cassette will be used, and positions film accordingly; notes whether bilateral views are called for.

i) For lateral projection of nasal bones, performer uses cassette, nonscreen film holder, or dental

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occlusal film. For occlusal film, has patient assume semiprone position as described. Adjusts head so that median sagittal plane is parallel with the horizontal (table top), and interpupillary line is at right angles to table top. Adjusts flexion so that infraorbitomeatal line is parallel with transverse axis of table. Supports jaw. Places sandbags and/or blocks under the side of the nose against the orbit and cheek of side of interest, and places film packet on top, with pebbled surface facing and parallel with the median sagittal plane. Slips it under nose so that upper border extends about .5 inch above superorbital ridge, and rests it against maxilla and superorbital ridge. May place film packet at an angle to avoid discomfort of patient, but has packet parallel the median sagittal plane of head. Gives patient leaded gloves and has patient hold film packet in position.

For nonscreen film holder or cassette, has patient take seated erect position before vertical cassette holder or in chair with headrest. Adjusts head so that median sagittal plane is parallel with plane of film, interpupillary line is at right angles with plane of film, and infraorbitomeatal line is parallel with transverse axis of film. Centers unmasked half of film to the fronto-nasal region on the affected side, at the level of the nasion.

Directs central ray at right angles to the profiled bridge of the nose, at a point 3/4 inch distal to the nasion. After the first exposure, adjusts for filming the opposite side similarly.

ii) For axial, superior-inferior projection (inferior-superior view) of the nasal bones, performer uses cassette, nonscreen film holder or dental occlusal film.

If patient is most comfortable in erect position, adjusts head so that median sagittal plane and glabelloalveolar line are vertical. Otherwise, adjusts so that median sagittal plane is vertical and glabelloalveolar line is horizontal or parallel with any plane of elevation of the head.

If patient can hold film between anterior teeth, inserts film packet (with pebbled surface of occlusal packet facing upward) about one inch into mouth, with long axis of film in AP direction. Centers to the median sagittal plane. Has patient close lips and teeth. Adjusts so that film is held in position with its plane at right angles to glabelloalveolar line. Adjusts mandible backward to correct for upward angulation and forward to correct for downward angulation. May tilt seated patient forward to avoid exposure to the area of the gonads.

For patients who cannot hold film between teeth, performer places cassette or nonscreen film holder under patient's chin at right angles to glabelloalveolar line and supports. Adjusts so that median sagittal plane is vertical, and centers unmasked half of film to median sagittal plane.

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Directs central ray along the glabelloalveolar line at right angles to the plane of the film.

j. For studies of the maxillae, performer prepares dental occlusal film packets. Does not insert in patient's mouth until head has been positioned and immobilized, patient has been shielded, and central ray adjusted in approximate position. Utilizes seated position if headrest is available.

   i) For axial, intraoral projection (axial, occlusal view) of the hard palate and dental arch of the maxillae, performer has supine patient rest head on table or caudally inclined block, and adjusts so that median sagittal plane and occlusal plane are both at right angles to table.
   Performer adjusts seated patient so that median sagittal plane is vertical and occlusal plane is horizontal.
   Adjusts central ray so that it will be at right angles to film (when it is held in mouth) centered to intersection of the median sagittal plane and a coronal plane passing through the outer canthi. Just before exposure, performer has patient open mouth. Performer inserts film packet with pebbled surface facing up and long axis directed transversely. Centers film to the median sagittal plane of the head, and moves it back so that film is in contact with the anterior borders of the mandibular rami. Has patient lightly close mouth to hold film. Rechecks and readjusts position of head and x-ray tube as described above.

   ii) For semiaxial, intraoral projection (oblique occlusal view) of the anterior part of hard palate and alveolor process, performer has supine patient rest head on an angle block caudally inclined at 15°. Adjusts so that median sagittal plane of head is vertical and occlusal plane is at right angles to the plane of the block. Directs central ray to lower third of nose at 45° to 50° caudad.
   Performer adjusts seated patient as in (i), above, and directs central ray so that it forms a 60° to 65° angle with the plane of the film.
   Just before exposure, performer has patient open mouth. Inserts film packet with pebbled surface facing up and long axis in AP direction. Centers film to the median sagittal plane and inserts back so that it is in contact with the anterior borders of the mandibular rami. Has patient close mouth to hold film. Rechecks and readjusts position of head and x-ray tube as described above.

   iii) For semiaxial, intraoral projection (oblique occlusal view) of the posterior part of hard palate and alveolar process, performer has supine patient rest head on table. Rotates away from the side of interest so that median sagittal plane of head is at 60° with plane of table, and adjusts so that occlusal plane is at right angles with table. Directs central ray to the canine fossa at 60° caudad.
   Performer adjusts seated patient as in (i), above, and directs central ray to the canine fossa at an angle of 30° to the median plane and an angle of 60° with the plane of the film.

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Just before exposure performer has patient open mouth. Inserts film packet with pebbled surface facing up and long axis in AP direction. Centers about .5 inch laterally from the median sagittal plane towards the side of interest, and inserts back so that film is in contact with the anterior border of the mandibular ramus. Has patient close mouth to hold film. Rechecks and readjusts position of head and x-ray tube as described above. If so ordered, repeats for opposite side.

k. For studies of the mandible, performer reviews purpose and areas of interest. Notes whether examination is to demonstrate mandibular fractures. Unless otherwise ordered, makes direct lateral and frontal projections of rami, axial projection of mandibular body, and intraoral or extraoral projection of mandibular body.
For intraoral or extraoral projections of the body, dental arch and symphysis of the mandible, performer chooses dental occlusal packet, nonscreen film holder, or cassette as determined by institutional practices.
If dental occlusal film is to be used, performer does not position in patient's mouth until head and central ray have been positioned.
For axiolateral projections of mandible, performer notes whether patient is to be positioned in a semiprone, or seated position with head on a cranially inclined block, or prone or seated with head on horizontally placed cassette, or semisupine with head on cranially inclined cassette. For accident patients or for those whose skull should not be rotated, has patient

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supine, with cassette placed vertically. If bilateral views are called for, employs similar positioning for opposite side after first exposure.
When head is resting on affected part, does not apply pressure when immobilizing.

i) For an axiolateral projection of the body of the ramus of mandible, performer reviews position, area of interest and angulation called for.

ia) Adjusts head of semiprone or seated patient on an angle block placed at a 15° cranial angle. Extends cheek of affected side over angle block and depresses shoulder of elevated side. Places cassette under cheek, with long axis of mandibular body parallel with transverse axis of film, centered to the occlusal plane midway between the angle and the symphysis of the jaw. Tapes cassette to angle block. Adjusts head so that the broad surface of the mandibular body is parallel with the plane of the film. Directs central ray to the midpoint of the film at 30° cephalad.

ib) Adjusts head of prone or seated patient on a cassette placed horizontally. Extends arm of the side being examined above head in comfortable position and arranges body in slightly oblique position. Has patient rest affected cheek on cassette so that long axis of the mandibular body is parallel with the transverse axis of film, and centers to the area of the

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first molar. Rotates so that broad surface of the mandibular body is parallel with the plane of the film. Directs central ray to the midpoint of the film at 25° cephalad and 10° anteriorly.

(ic) Adjusts head of semisupine patient on an angle block directed cranially,with affected cheek in lateral position on cassette, and affected side of body next to table. Adjusts elevation of cassette adjacent to shoulder so that cassette is in close contact with jaw. Extends head so that long axis of mandibular body is parallel with transverse axis of film. Centers unmasked half of film to body of mandible and supports. Rotates head so that the broad surface of the mandibular body is parallel with the plane of the film. Rests head on cheek (for posterior area of body of mandible) or on side of chin (for anterior area of body of mandible). Directs central ray to the midpoint of the unmasked half of film at 20° cephalad, entering about 2 inches distal to the angle of the upper side of the jaw.

(id) With accident patient in supine position where rotation is contraindicated, performer places cassette in vertical position on the side of interest, parallel with the median sagittal plane. Centers to the occlusal plane. Directs central ray horizontally at 30° to 35° cephalad and at 10° posteriorly.

ii) For an axiolateral projection of the mandibular ramus, performer positions as for the body, (i) above, except for the following differences:

(iia) For semiprone or seated positioning with head at 15° cranial angle, performer centers cassette to a point .5 inch anterior to and one inch inferior to the external auditory meatus. Adjusts head so that broad surface of ramus is parallel with plane of film and acanthiomeatal line is parallel with transverse axis of film. Directs central ray 30° cephalad and 10° posteriorly, directed to midpoint of film.

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(iib) For prone or seated patient with horizontally placed head, centers film as in (iia) above, with broad surface of ramus parallel to plane of film and chin extended. Directs central ray to midpoint of film at 25° cephalad.

(iic) For semisupine patient,centers film as in (iia), above, with broad surface of ramus parallel to plane of film and chin extended so that the acanthiomeatal line is parallel with the transverse axis of the film. Directs central ray to the midpoint of the film at 25° cephalad.

(iid) For supine accident patient positions as in (id). Directs central ray at 30° to 35° cephalad and 10° to 20° posteriorly.

iii) For an axiolateral projection of the symphysis of the mandible, performer positions as for the body,(i) above, except for the following differences:

(iiia) For semiprone or seated positioning with head at 15° cranial angle, has patient extend chin. Centers cassette to the region of the mental foramen. Rests head on side of chin with the long axis of the mandibular body parallel with the transverse axis of the film. Directs central ray to midpoint of film at angle 30° cephalad and 10° posteriorly.

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(iiib) For prone or seated patient with horizontally placed head, centers film to occlusal surface of the canine region with head resting on extended chin, nose and zygoma. Directs central ray to midpoint of film at angle 20° cephalad.

(iiic) For semisupine patient, adjusts as in (ic) above, but has head rest on the side of the chin.

iv) For PA and semiaxial projections (anterior views) of the body of the mandible, has patient assume prone or seated PA position as described. Centers median sagittal plane of head to midline of film, with head resting on nose and chin, with anterior surface of mandibular symphysis parallel to the plane of the film. Adjusts median sagittal plane of head so that it is at right angles to plane of film. Centers film to a point midway between the lips and the tip of the chin. Directs central ray at right angles to midpoint of film.

v) For PA and semiaxial projections (anterior views) of the mandibular rami, reviews area of interest. Adjusts patient in prone or erect position as in (iv), above, except as follows:

Centers film about 2 inches above mandibular symphysis. For survey film centers to the lips; and for condylar processes, centers to the glabella.
Directs central ray midway between the temporomandibular joints at 30° cephalad. For survey film directs central ray at right angles to the lips. For condylar processes, directs central ray to the glabella at 20° to 25° cephalad.

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Performer may rehearse patient in filling mouth with air and holding breath to provide better contrast.

vi) For a verticosubmental projection (axial view) of the mandible, performer has patient assume a prone or seated position with head resting on chin extended across a cassette lying horizontally and supported. Centers median sagittal plane of head to midline of film at a level just below the external auditory meatuses. Supports cassette so that it is in direct contact with throat and, if angulation is needed, at a cranial angle. Adjusts head so that median sagittal plane is vertical. If cassette is horizontal, directs central ray to midpoint of film at right angles to the infraorbitomeatal line. If cassette is angled cranially, directs central ray to midpoint at right angles to the occlusal plane.

vii) For a submentovertical projection (axial view) of the mandible, performer has patient sit in AP position before a vertical cassette holder or lie in supine AP position with trunk elevated. Has patient extend head and rest it on vertex. Adjusts so that median sagittal plane is vertical and orbitomeatal line is parallel with plane of film. If full extension cannot be attained, inclines cassette caudally. Centers cassette to central ray. Directs central ray at right angles to the infraorbitomeatal line at midpoint of the external auditory meatuses.

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viii) For superoinferior (AP) extraoral projection (oblique PA view) of the mandibular symphysis, performer has seated patient extend chin over a film packet or cassette placed horizontally at end of table and supported at comfortable height. With occlusal film places it with pebbled side up and long axis in AP direction. Centers median sagittal plane of head to midline with chin well forward. Directs central ray posteriorly at 40° to 45°,centered to mandibular symphysis midway between lips and tip of chin.

Performer has supine patient rest head on its occiput, with median sagittal plane at right angles to table. Adjusts flexion so that inferior border of body of mandible is vertical. Adjusts packet of occlusal film under chin with long axis in AP direction, centered to the median sagittal plane, with pebbled surface in contact with chin. Tapes packet in place or supplies leaded gloves and has patient hold film packet in place. Directs central ray to the mandibular symphysis as above, at 40° to 45° caudad.

ix) For an oblique inferosuperior intraoral projection (oblique occlusal view) of the mandibular symphysis, performer has supine patient rest head on its occiput. Adjusts so that median sagittal plane and the occlusal plane are at right angles to table. Directs central ray to tip of the chin at 55° cephalad.
Performer adjusts seated patient so that median sagittal plane is vertical and occlusal plane forms an angle of 55° with the horizontal plane.

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Directs central ray to the tip of the chin parallel with the occlusal plane.
Just before exposure, performer has patient open mouth. Performer inserts film packet with pebbled surface facing caudally and long axis in AP direction. Centers film to the median sagittal plane of head and moves it back so that it is in contact with the anterior borders of the mandibular rami. Has patient close mouth to hold film. Rechecks and readjusts position of head and x-ray tube as described above.

x) For an inferosuperior intraoral projection (occlusal view) of the body and dental arch of the mandible, performer supports thorax of supine patient. Has patient extend head and rest it on vertex. Adjusts so that the median sagittal plane is vertical.
Performer adjusts seated patient so that median sagittal plane and occlusal plane are both vertical.
Directs central ray at right angles to expected plane of film packet (once inserted),centered to the median sagittal plane at the level of the coronal plane passing through the second molars.
Just before exposure, performer has patient open mouth. Inserts film packet with pebbled surface facing caudally, and long axis directed transversely. Centers film to the median sagittal plane of head and moves it back so that it is in contact with the anterior surfaces of the mandibular rami. Has patient close mouth to hold film. Re-

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checks and readjusts position of head and x-ray tube as described above. 1. For studies of the temporomandibular articulations, performer reviews whether closed and/or open mouth positions are called for. For accident patient does not attempt open mouth position unless approved by MD. Makes frontal and lateral projection. May use stereography. For closed-mouth positions explains to patient that the posterior teeth must be occluded rather than the incisors. Rehearses patient and checks occlusion. For open-mouth positions performer immobilizes head after positioning. Has patient open mouth as wide as possible. Makes sure that jaw is not protruded. Rechecks position of head. Performer notes whether patient can immobilize mouth in open position by phonating the sound "ah-h." If not, performer selects a cork of appropriate size and has patient grasp it between teeth. Rechecks position of head. If both open-and closed-mouth projections are called for, performer uses a cassette tunnel or bucky and has patient maintain position of head while cassette is repositioned for second exposure. Places cassette changing tunnel into position before positioning patient. Marks patient and cassettes for centering as appropriate. For semiaxial, transcranial projection, marks a point on each cheek .5 inch anterior to and one inch below the external auditory meatus. For inferosuperior transfacial projection, marks a point on each cheek .5 inch anterior to and one inch above the external auditory meatus. For lateral and oblique transfacial projections, marks a point on each	cheek .5 inch anterior to the external auditory meatus. i) For a lateral projection of the temporomandibular articulations using direct contact technique, performer has patient assume semiprone or seated position in front of vertical cassette holder. Has patient rest head against film holder in lateral position on the side of interest. Centers unmasked half of film to the marked centering point. Adjusts head so that median sagittal plane is parallel with the plane of the film and interpupillary line is at right angles with the plane of the film. Extends head so that occlusal plane is parallel with the transverse axis of the film. Centers x-ray tube in contact with the cheek on opposite side of face, directed along the long axis of the upper condyle at 15° cephalad and 10° anteriorly, or at right angles to the plane of the film through the upper centering mark. Performer explains open- and closed-mouth procedures to patient. Asks patient to retain position for first and second exposure (closed and then open-mouth position) if appropriate, while cassette is shifted or changed. Performer then positions patient on opposite side for bilateral study and has patient hold position for third and fourth exposures. For closed mouth exposure performer rehearses patient in closing mouth as described above and inhaling slowly through the nose during the

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exposure; rechecks angulation. For open-mouth exposure performer has patient practice opening mouth and phonating or uses cork, as described above; rechecks angulation. ii) For a lateral transcranial projection of temporomandibular articulations, performer has patient assume semiprone or seated position with head placed on cassette changing tunnel that is caudally inclined at 15°. Has patient rest cheek on affected side and centers unmasked half of tunnel to the marked centering point. Adjusts head so that acanthiomeatal line is parallel with transverse axis of film. Directs central ray at right angles to the midpoint of film, through the centering marks. Performer explains open- and closed mouth procedures to patient. Asks patient to retain position for first and second exposure (closed and then open-mouth position) if appropriate while cassette is shifted or changed. Performer then positions patient on opposite side for bilateral study and has patient hold position for third and fourth exposures. Performer rehearses patient for closed-mouth exposure as described above. Rechecks angulation. If appropriate, rehearses open-mouth exposure by having patient open mouth and phonate, or uses cork, as described above; rechecks angulation. iii) For a lateral transfacial projection of temporomandibular articulations, performer has patient assume a semiprone position or be seated in front of vertical cassette holder. Has patient rest cheek on affected side against	cassette holder in lateral position. Centers unmasked half of film to the marked centering point. Adjusts head so that median sagittal plane is parallel with plane of film and interpupillary line is at right angles with plane of film. Extends head so that the infraorbitomeatal line is parallel with transverse axis of film. Directs central ray through the centering point on the side of interest at 20° cephalad or anteriorly 20° and cephalad 20°. Performer explains open- and closed-mouth procedures and bilateral positioning as described above; performer rechecks angulation after patient closes mouth or opens as appropriate. iv) For a semiaxial AP projection (semiaxial posterior view) of the temporomandibular articulations, performer prepares cassette tunnel inclined caudally at 30° or 35°. Has patient assume supine position as described, with head resting on cassette holder. Centers to the median sagittal plane of the patient's neck at a level directly below the temporomandibular joints. Adjusts head so that median sagittal plane is vertical and orbitomeatal line is at right angle to plane of film. Places tape across chin and anchors to table or holder. Directs central ray at right angles to the horizontal plane, directed to a point about three inches above the nasion. Performer explains open- and closed-mouth procedures as described above; performer rechecks angulation after patient closes mouth or opens as appropriate.

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v) For a semiaxial transcranial projection (semiaxial lateral view) of the temporomandibular articulations, performer positions patient in semiprone or seated position in front of vertical cassette holder. Has patient rest cheek on affected side against cassette holder in lateral position. Centers unmasked half of film to the marked centering point. Adjusts head so that median sagittal plane is parallel with plane of film and interpupillary line is at right angles with plane of film. Directs central ray to the centering mark on the side of interest at 25° or 30° caudad, entering the upper parietal region.
Performer explains open- and closed-mouth procedures and bilateral positioning as described above; performer rechecks angulation after patient closes mouth or opens as appropriate.

vi) For an oblique transfacial projection (axiolateral view) of the temporomandibular articulations, performer has patient assume a lateral position, recumbent or seated, with patient's head resting on the parietal region of the side of interest in a lateral position. Centers unmasked half of film to marked centering point. Rotates head slightly from the lateral position and adjusts longitudinal position of the head so that the median sagittal plane forms a 30° angle with the plane of the film, open towards the feet. Directs central ray at right angles to the marked centering point on the side of interest, entering just distal to the angle of the jaw on the uppermost side.

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Performer explains open- and closed-mouth procedures and bilateral positioning as described above; performer rechecks angulation after patient closes mouth or opens as appropriate.

vii) For an inferosuperior transfacial projection (oblique lateral view) of the temporomandibular articulations, performer has patient in a semiprone position, turned toward the side of interest. Has patient rest head on the parietal region with median sagittal plane horizontal. Rotates head slightly from the lateral. Centers unmasked half of film to the marked centering point on the side of interest. Adjusts longitudinal position of head so that the median sagittal plane forms a 10° to 15° angle with the plane of the film open towards the feet. Directs the central ray to the marked centering point on the side of interest at 30° cephalad, entering below the angle of the jaw on the uppermost side.
Performer explains open- and closed-mouth procedures and bilateral positioning as described above; performer rechecks angulation after patient closes mouth or opens as appropriate.

14. If, during positioning, patient shows signs of severe pain, performer may notify appropriate physician at once and await orders, or may decide on alternative positioning to avoid movement of the affected part.

15. Performer checks final positioning using triangles, protractor and light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collima-

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tor opening to correspond to the film size (or the size of the unshielded areas of the film to be exposed). Uses cross-hair shadows as reference for center of field. Uses the collimator light to center the patient to the x-ray field, or centers the part to the film holder and uses the collimator light to center the tube to the part. Rechecks angulation of head and central ray. Checks that the primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired. May readjust tube position lengthwise or crosswise to provide better centering.

16. Once the patient has been positioned and immobilized, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). For small fields (if not already done in positioning) performer attaches an auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the part(s) of interest.

17. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that protective shielding has been provided to patient and everyone who will remain in room.

18. Throughout procedure performer observes patient for any signs of emergency and/or to prevent or respond to an accident. Is alert to signs of nausea, dizziness, or sweat suggesting faintness. Performer may have patient lie down, lower head, or raise legs.

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Notifies nurse. If patient shows any other emergency signs, loses consciousness, or has an accident, performer calls appropriate physician or staff member at once. May decide to provide emergency first aid as well. If a patient's catheter becomes disconnected, performer clamps it and immediately notifies nurse. If catheter should come out, notifies staff member at once.

19. When everything is ready for the exposure, performer reviews with patient what breath control will be used for exposure:

    a. Performer has patient hold breath until told to relax by performer for all projections of the cranium, cranial base, sella turcica, optic foramen, inferior and superior orbital fissures, anterior clinoid processes, sphenoid strut, mastoid processes, petrous portions, temporal styloid processes, jugular foramina, facial bones, zygomatic arches, nasal bones, maxillae, mandible, and closed-mouth projections of the temporomandibular articulations, except as follows:

        i) For lateral, AP or oblique AP projections of the temporal styloid processes, transoral projection of the jugular foramina, anterior profile projection of hypoglossal canal, oblique lateral and transoral axial projections of the zygomatic arches, and open-mouth studies of the temporomandibular articulations, performer has patient open mouth wide and softly phonate the sound "ah-h" during the exposure as rehearsed. May have patient hold cork in teeth just prior to exposure and hold

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breath as rehearsed. Rechecks position and angulation.

ii) For PA and semiaxial projections of the rami and condylar processes of the mandible, performer may have patient fill mouth with air, and then hold breath during exposure, as rehearsed.

iii) For closed-mouth projections of the temporomandibular articulations, performer has patient close mouth by occluding posterior teeth. Has patient hold breath or inhale slowly through the nose until told to relax, depending on the projection, as rehearsed earlier.

b. Reminds patient about those positions which are to be maintained for a second exposure.

c. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

20. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to breathe as instructed by calling or using intercom. Performer initiates exposure by pressing hand trigger or exposure control button.

a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.

b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction, may decide to report; anticipates need to repeat exposure.

c. With phototimer notes whether backup timer has been involved in terminating exposure before phototimed

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exposure was completed. If so, anticipates possible need to repeat exposure (due to underexposure if premature cut-off, or overexposure due to faulty timer).

d. After exposure is completed tells patient that he or she can relax.

e. If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

21. Performer returns to patient. Removes cassette or film holder from table, floor, or bucky.

a. Removes any markers for further use. If bilateral views are to be taken on the film, removes leaded rubber mask and remasks all but next area to be exposed.

b. If the patient is accident victim or if so requested, performer arranges to have the first exposure(s) processed at once and brought to the appropriate radiologist.

c. If the first radiograph(s) are preliminary (scout) films, performer brings the processed radiograph(s) directly to the radiologist in charge or places on view boxes and informs radiologist that the scout (s) are ready. If the radiologist indicates that there is any problem with the technical factors or the patient positioning, performer records or notes for later use in the examination and/or repeats preliminary radiography as ordered.

d. Depending on whether radiologist will evaluate radiographs before completion of all possible exposures for the series, performer arranges to process film(s) and evaluate for quality control personally, have this done, or bring to

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darkroom for processing and later evaluation, based on time available, institutional arrangements, or specific instructions. Attaches ID card for use with flasher if appropriate. May sign requisition.

e. While films are being processed and/or evaluated performer has patient relax in examination room or holding area. Explains what will happen next.

  i) Performer determines whether patient should remain on table and/or in room or requires observation. May consult requisition sheet or attending RN. If appropriate, makes sure that patient will be attended while waiting.
  ii) If appropriate, moves x-ray tube and any protruding film holder away from patient before patient rises.
  iii) May decide to assist patient to chair or stretcher or from table. Makes sure patient is reminded of any footrest in stepping off table.

22. When (or if) performer learns from the radiologist the extent of the injury and/or whether further conventional views and/or positions can be undertaken, eliminated or altered, performer proceeds as appropriate according to instructions.

  a. For further exposures performer repeats appropriate steps for next view(s) including identification of film holder or cassette and use of R-L marker, selection and setting of technique for next view (if different), positioning patient and equipment for focus-object-film alignment, proper collimation and shielding, breathing instructions, and making exposure, as described

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above. For bilateral exposures on one film, keeps R-L reference constant; centers using the point marked earlier on the cassette.

  b. Performer refrains from commenting on the films or providing any interpretation.
  c. If performer is asked to repeat any exposures, makes sure that the additional exposures are warranted medically, since additional radiation will be incurred.

    i) Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."
    ii) If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member.
    iii) If request for retakes reflects the preference for density or contrast of a radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.

23. When performer is sure that the examination has been completed, performer may have patient transported back to holding area or next location, or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient as described above.

24. Performer carries out termination steps for the examination:

  a. Performer has equipment and examination table cleaned after use or decides to do personally, depending on institutional arrangements.

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b. Performer records the examination according to institutional procedures. May include date, room, examination type, the views taken, the technical factors used and film sizes; may record the number of exposures made of each view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. If any views called for in the initial request could not be obtained, performer may record reasons. Signs requisition sheet.

c. If performer will only carry out preliminary "scout" filming and another technologist will continue with examination, performer records the approved technical factors used for the scouts, and the accessories employed, or informs technologist who will continue. Performer gives the requisition sheet, name card, and any notes to technologist who will continue with procedure.

d. Performer may decide to jacket films, requisition sheets, and related materials and/or have information recorded in log book personally or have this done, depending on institutional procedures.

e. For profile study of relationship of bony and soft tissue contours of facial bones, performer obtains films after processing. Marks bone projection (film from cassette) to be used in preparing contact print for mask, (as in subtraction technique) to be superimposed on soft tissue projection (film from envelope) for a composite print; marks soft tissue projection appropriately. May fill out order for preparation of composite print (same process as subtraction technique), and place with radiographs for processing by darkroom aide, or decides to do personally.

f. May indicate to appropriate staff person when the performer is ready to proceed with next examination.

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1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured,positioned;parts measured;films identified;technical factors selected and set; technique for bilateral filming, stereography set up; exposures made; radiographs sent for processing and evaluation; procedures repeated as appropriate for full set of views; patient returned; examination recorded; radiographs placed for use.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, technical history;pen;x-ray machine control panel(s), tube,bucky,table,collimator,extension cones;technique chart;charts for conversion of technique,standard examination views,dosage,tube capacity;loaded cassettes;upright film holder;leaded rubber shielding; R-L and ID markers;immobilization devices;sinus mask or face rest;head clamp;weighted band;tape;chair;calipers;protractor;triangles;stool;scissors;cassette tunnel;marking pen;cork;stretcher or wheelchair

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-infant patient to be radiographed; radiologic technologist; radiologist; nurse

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Taking plain film radiographs of the paranasal sinuses of a non-infant patient by reviewing request; reporting observed contraindications; reassuring pt.; measuring part;setting up for bilateral exposures, stereography as ordered;selecting and setting technical factors;identifying film;positioning pt. and equipment for erect seated or recumbent exposure;providing shielding;collimating;making exposure;having radiographs processed and reviewed;repeating for full set of views or as ordered;having pt.returned;placing radiographs for use;recording examination.

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Performer receives or obtains the x-ray requisition form, patient's identification card, and any appropriate medical-technical history for a non-infant patient scheduled for radiography of the paranasal sinuses:

a. After checking assignment on schedule sheet.
b. From co-worker.
c. After having arranged requisitions in order of priority.

The plain films of the sinuses may serve as preliminary "scout" films for contrast studies.

1. Performer reads the requisition sheet to determine the examination called for, purpose, the patient involved, special considerations, and to check the completeness of the information provided:

   a. Performer checks the examinations called for including the side of interest and the affected areas, whether the study is to provide pre-operative measurements, whether bilateral or unilateral views are requested, the patient positions and views called for, the number of exposures, the central beam angulation, the areas and parts to be included. Notes whether there will be bilateral views on a single film, whether the use of a grid or bucky will be involved.

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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Checks the name of the referring physician.

b. Performer reads patient's name, identification number, sex, age, and weight. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information that will affect patient positioning, technique, or handling of the patient, whether patient will be on a stretcher or wheelchair, and the nature of any known pathology which would affect technique.

c. Performer checks whether patient is suffering from a collateral condition requiring special handling, such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter or similar device in place; notes whether patient will be accompanied by nurse or other staff person.

d. With patients who are to undergo subsequent contrast studies, performer may note whether orders for prior preparation have been given and carried out; if not already done, may arrange to have orders carried out or informs appropriate staff member. If patient's record indicates orders for sedation or any other prior medication, performer may check timing to be sure a proper elapse of time has occurred for medication to take effect. May arrange to delay examination if appropriate.

e. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved. Goes to examination room or control room for machine involved. Checks that proper shock-proof equipment is available in room for use in direct contact with patient's head.

f. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete. Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

g. Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether number of radiographic exposures ordered or done in past should be brought to radiologist's attention.

h. Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus. Notes shielding needed.

i. If referring physician has requested that films already on file be sent with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer notifies supervisor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

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3. When performer is clear about what will be involved in examination, he or she prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Performer reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).
   b. Performer washes hands as appropriate; depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
   c. Performer may set up equipment as appropriate for stereographic projections if ordered.
   d. Performer makes sure that x-ray equipment is ready for use. Goes to control panel for x-ray generator and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for machine to "warm up." If appropriate, performer may set radiography mode selector and set collimator control for manual operation.
   e. Performer checks that appropriate immobilization devices such as sandbags, angle blocks, tape, weighted band, Granger sinus mask or face rest are present, and that there is a mattress, pads, pillows, and/or blankets for comfort of patient if patient will lie on table. If appropriate, obtains protractor, cardboard triangles, cassette tunnels.
   f. Checks that there is leaded rubber shielding available in room to be used to protect the patient, and/or to place beneath the film holder, as appropriate.
   g. Performer prepares for identification of the films using equipment provided by institution:

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      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
      iii) Checks identification against requisition sheet.
      iv) Performer makes sure that right (R) and left (L) markers are available for use.

4. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

   a. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.
   b. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.
   c. Has patient assume a comfortable position seated on table or chair. If patient is in wheelchair, moves patient in chair into position next to table. If patient is on special

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stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move patient to table.

d. Performer explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

e. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains when asked medical questions that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

f. If patient has an IV drip in place, performer checks that needle has not become dislodged and that the fluid is dripping at an even rate. If there are any problems, performer clamps tube and notifies an MD or appropriate staff person at once. If there is a wet dressing, performer has it reinforced or decides to do personally.

g. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs appropriate physician and proceeds only with approval.

h. If not already done, has patient remove dentures, hair pins, spectacles, and any jewelry from head and neck. Makes sure that all garments are removed down to below the neck.

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5. Performer questions patient and/or RN or MD present on what movement is possible to determine what positions are available for use.

   a. Performer notes whether patient can be examined in the standard body positions called for with the projections ordered; if not, plans to substitute alternative body positions to achieve the same projections.

   b. Performer notes whether patient can assume erect positions for projections where this is an option. Chooses erect seated position for demonstrating fluid levels unless otherwise indicated, such as for cardiac patient.

   c. Where erect and recumbent, or tilted positions are ordered, performer plans to allow enough time before exposure to permit exudate to gravitate to its natural level.

   d. Observes whether patient is obese or has a short neck requiring special positioning or use of angle block under film. Notes whether thin patient will need padding under bony prominences.

   e. Performer considers the number and types of projections ordered for the examination and the patient's condition. Performer may consider a change from standard projections to better accomplish the purpose of the examination, or deletion of a position, or a change in technical factors. Depending on institutional arrangements, performer may obtain permission from appropriate radiologist or decides personally to alter the standard procedure.

6. Depending on whether a bucky or table top technique will be used and standard institutional practices, perform-

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er selects speed and type of film, grid, and cassette combination.

- a. Selects size(s) based on the area(s) to be included, the patient's skull size, and whether bilateral views are to be exposed on a single film.
- b. Performer makes sure that an adequate supply of loaded cassettes of the types and sized selected are available in the examination room. If not, arranges to obtain or decides to obtain personally.

7. Performer prepares for the examination:

   - a. Performer obtains the appropriate size loaded cassette for the first projection.
   - b. May mark midpoint of each cassette (or each half of a cassette to be used for separate bilateral views). Uses radiolucent marker.
   - c. If bilateral exposures will be made separately on one film, performer mentally decides how these will be positioned so that the film need not be turned for viewing each image. Performer uses leaded rubber sheets and masks the cassette completely except for the half to be exposed. Treats the half to be exposed from this point as though it were the actual film size.
   - d. If bilateral views are to be projected on a single film for a stereoscopic examination, performer numbers or marks cassettes so that the order of their placement and exposure will be correct.
   - e. Performer attaches identification information to the cassette or table top:
     - i) Places right or left marker on film holder or table-top as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.

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     - ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of cassette.
     - iii) If patient identification information is to be entered by use of flasher, sets flashcard aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.
     - iv) Performer may place patient's card into card tray for equipment using automatic film marking device.
   - f. If cassette is to be used with bucky (under tabletop or in upright holder) performer may manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.
   - g. If a bucky is not being used, performer places cassette in a position that approximates its location in the final positioning. If appropriate to make possible minimal movement of patient, performer may place cassette in upright holder at right angles to table top or in other position selected.
   - h. Performer provides patient and everyone who will remain in room during exposure with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

8. Performer has patient assume a comfortable recumbent or seated position, depending on the positions to be employed, so that the relevant skull dimensions can be measured. Makes sure

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that wheelchair is in locked position if patient is to be positioned in it.

a. If appropriate, places mattress, pillow, or clean linen on x-ray table.
b. Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way and may be collided with by patient.
c. If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.
d. Performer uses centimeter calipers to measure the thickness of the part(s) to be radiographed in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors.
e. After measuring, has patient rest in as relaxed a position as possible. May place pad, blanket or pillow under bony prominences to provide comfort.

9. Performer selects the exposure factors for the first projection by consulting the technique chart(s) posted for the machine:

a. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other accessories (such as screens, grids, bucky, etc.).
b. Makes note of the kVp, mA, T(seconds of exposure time), focal spot size, and the focal film distance (TFD or FFD) called for. Makes note of any difference between FFD for preoperative measurements and other purposes and uses relevant distance as appropriate.
c. Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for a pathological condition, change in TFD, preference of the radiologist involved, and any other conversion needed. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate.
d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

10. Performer sets exposure factors as selected:

a. Enters control room. Makes sure that indicator light shows that x-ray generator is ready for use. Makes sure that all circuits have been stabilized.
b. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.
c. For conventional exposure control:
    1) Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.

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- ii) Performer selects and sets the exposure time that will produce the mAs desired.
- iii) Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

d. For automatic phototimed exposure control:

- i) Performer selects and sets the category corresponding to the type of study and use or nonuse of screens, bucky, etc., and, if appropriate, focal spot size.
- ii) Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).
- iii) May select and set a kVp range button (if called for with equipment) corresponding to range for examination.
- iv) Sets a density selector corresponding to the usual (or special) requirements for the study.
- v) Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.

e. Depending on the equipment, may set controls to provide for use of bucky, manual tableside adjustment of table and tube height, position, and of collimation, unless these have already been set.

f. Performer returns to overhead unit; sets the focal-film distance, if not already done, as appropriate to purpose of the study. Operates controls or manually moves the x-ray tube into place over the film holder (or at right angles to upright holder). Checks focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.

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11. Performer prepares the part to be radiographed in the position selected for the first (or next) exposure (unless this is done by physician):

a. May explain or demonstrate to patient what is required. May obtain help in positioning.

b. Performer positions patient by first positioning body and then positioning head. In positioning body, performer proceeds as follows:

- i) For positioning patient in AP or PA supine or erect position, performer arranges body so that its median sagittal plane is centered to the midline of table or film holder. For lateral positioning has median sagittal plane of body lie parallel to the midline.

  Supports any elevated parts. Has erect seated patients distribute weight evenly on both buttocks.

  Has erect patient face film holder for PA projection and face away from film holder for AP projection.
- ii) Has prone patient flex elbows, place arms in a comfortable position. Supports ankles. Rests patient's head on forehead and nose. May have patient rest hands beneath chest.

  Has semiprone patient rest on forearm and flexed knee of elevated side; supports ankles and flexed knee.

  Has supine patient place arms in a comfortable position and supports ankles and knees.

  For oblique erect position adjusts body to make possible

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correct angulation of the head. Places arms in comfortable position.

iii) For thin patient in recumbent lateral, PA, and oblique positioning, performer may elevate chest so that the cervical vertebrae are at a correct level.

iv) With all positions arranges shoulders to lie on a single transverse plane.

v) For obese patient performer positions in seated erect position when possible. Uses a portable cassette holder if possible in the vertical or horizontal position to obtain a correct part-film distance without magnification. Adjusts tube position as appropriate. If not able to achieve correct part-film distance, performer adjusts focal-film distance to compensate.

c. In positioning head, performer refers to standard reference lines. May use wax marker to draw in reference lines or points of skull, or visualizes mentally. Has patient first relax muscles of neck and then moves head gently.

i) Performer defines the median sagittal plane of the skull by referring to the sagittal line connecting nasion, acanthion and symphysis menti (mental point).

ii) Performer marks or defines the orbitomeatal line for reference as that connecting the external auditory meatus and the outer canthus of the patient's eye.

iii) Performer marks or defines the infraorbitomeatal line by finding the line connecting the external auditory meatus and the infraorbital margin. May palpate to find infraorbital margin.

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iv) Performer marks or defines the acanthiomeatal line as that connecting the external auditory meatus and the acanthion.

v) Performer defines the interpupillary line as the transverse line which connects the pupils of the eyes when the patient is looking straight ahead, with the nasion at its midpoint.

vi) Performer defines the glabelloalveolar line as that connecting the most prominent point in the midsagittal plane between the eyebrows and the most prominent point in the midsagittal plane of the upper alveolus.

vii) Performer immobilizes skull with a head clamp or a weighted band and rechecks angulation and position. Uses extension cone in direct contact with head when appropriate for immobilization (as well as for proper collimation). Rechecks positioning after immobilizing.

d. Performer centers part and keeps the long axis of the part parallel to the film holder. When using a bucky, centers patient to midline. With cassette on table top, centers film to part. With upright holder, adjusts height of holder to part and centers part to film. May obtain help in positioning.

i) In setting tube angulation performer measures the angles between the central ray and reference lines on the patient's skull, such as the orbitomeatal or interpupillary lines. Checks skull rotation by measuring the angle between the horizontal plane

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or the vertical central ray and the median sagittal line.

ii) In centering and directing the central ray for stereoscopic examination, performer centers and adjusts the central ray at the angle for a single plane study. For first exposure moves centering point the correct distance in the appropriate direction (such as lateralward or posterior); then increases or decreases the angle as appropriate. For the second exposure, removes the first cassette and replaces with a second cassette. Starts again from single plane angulation; shifts centering in the opposite direction for the same distance, and changes the angulation in the opposite direction (increases or decreases). For bilateral studies on single cassettes, has the first cassette include both sides shifted in the same direction and the second cassette including both sides shifted in the opposite direction, so that each cassette has bilateral views with a common shift direction; makes a total of four exposures for each study.

iii) If pre-operative measurements are to be taken from the radiographs, performer takes special precautions in measuring angulation. Uses triangles, rectangles, and protractors to check every angle or line placement.

12. Performer positions as follows (unless nonconventional positioning is being used to avoid having patient move):

a. For a lateral projection of the paranasal sinuses, performer has

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patient seated in a true lateral position before vertical cassette, with side of interest against cassette; may have patient lie in semiprone position or sit with head resting on a horizontally placed cassette on side of interest. Performer has patient rest head on the parietal eminence. Centers cassette or stereo cassette-changing tunnel to the outer canthus of the side of interest. Uses careful measuring to place median sagittal plane of head parallel with the plane of the film, and the interpupillary line at right angles to the plane of the film. Directs central ray at right angles to the midpoint, entering at the outer canthus of the uppermost side. For stereographic views, takes first exposure with tube centered as for single plane study. Shifts tube in posterior direction for second view. Reminds patient to retain position for second view while cassette is changed or shifted. If a bilateral study has been ordered, performer sets up similarly for opposite side lateral view.

b. For a PA projection (posterior view) of the paranasal sinuses, performer notes area of interest and whether Granger sinus mask or similar face rest will be used. For stereoscopic projections makes tube shifts in transverse or longitudinal direction.

i) For PA projection of the frontal sinuses and anterior ethmoidal cells, performer has patient assume a seated or prone PA position. Has patient rest head on the forehead and nose, adjusted so that median sagittal plane is at right angles to the plane

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of the film. Centers to the nasion. Adjusts flexion so that the orbitomeatal line is at right angles to plane of film. Directs central ray to glabella at 15° caudad or as ordered.

ii) For PA projection of the sphenoidal sinuses, performer has patient assume a seated or prone PA position. Has patient rest head on forehead and nose, adjusted so that median sagittal plane is at right angles to film. Centers to the glabella. Adjusts flexion so that the orbitomeatal line is at right angles to the plane of the film. Directs central ray to exit at the glabella at 10°-12° cephalad or as ordered.

iii) For a PA projection of the posterior ethmoidal cells, performer positions as for (i), above, but directs central ray at right angles to the midpoint of the film, entering in the occipital area.

iv) For a PA projection of the antra (maxillary sinuses) and the anterior ethmoidal cells, performer positions as for (i), above, but centers to the median saggital plane at a level midway between the infraorbital margins and the acanthion. Directs central ray at right angles to the midpoint of the film.

v) For a PA projection of the sphenoids, posterior ethmoids, and antra using a sinus mask for positioning, performer places a Granger or similar face rest for the sinuses on a 17° angle block directed cranially. Places cassette in position and immobilizes block. Has patient assume a seated or

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prone PA position with face lying on sinus mask so that nose projects through opening and face rests on the glabella and the upper alveolus. Locates a point on the median sagittal axis at the level of a line passing through the floor of the external auditory meatus. Directs central ray at right angles to that point or at cephalad angulation ordered.

c. For a PA parietoacanthial projection (anterior view) of the maxillary sinuses (antra), performer positions patient in erect seated PA position with the chin resting on cassette, cassette tunnel or table top. Adjusts so that median sagittal plane is vertical. Places head so that the orbitomeatal line forms a 37° angle with plane of film. Checks to be sure that head is extended so that a line connecting the external auditory meatus to the mental point is at right angles to the plane of the film. Centers cassette to the acanthion. Directs central ray at right angles to the midpoint of the film, entering the vertex and emerging at the acanthion.

For a study of questionable shadows, performer may tilt the head laterally to one side or the other so that the median sagittal plane forms an angle of 30° to 40° with the horizontal plane. For stereo projections makes tube shifts in transverse or longitudinal direction.

d. For an axial view of the paranasal sinuses, performer selects PA or AP positioning, erect or recumbent.

i) For a verticosubmental projection of the paranasal sinuses, primarily sphenoid sinuses

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and/or hyoid bone, performer has patient assume a prone or seated PA position with head extended over a horizontally placed cassette. Performer elevates the side of the cassette adjacent to the patient so that the extension of the throat provides the minimal part-film distance. Centers film to the throat midway between mastoid tips. Adjusts head so that median sagittal plane is vertical. Directs central ray at right angles to the infraorbitomeatal line, centered to the intersection of the median sagittal plane and a coronal plane connecting the sella turcica and the angles of the jaw.

ii) For a submentovertical projection of the paranasal sinuses, performer has patient assume a seated erect or supine AP position. For seated erect patient, performer places a low-back chair far enough away from the cassette holder to allow a semi-upright position,with patient leaning back and resting the vertex of the skull against the film holder. For supine patient, elevates torso so that head can be extended completely with head resting on the vertex. Flexes patient's knees. Performer supports head after adjusting central ray angulation,and repositions only when ready to make exposure so as to keep strain on neck to a minimum.
Adjusts head so that median sagittal plane is at right angles to film and so that the infraorbitomeatal line is closely parallel to the plane of the film. Adjusts the central ray angulation to be at right angles with the infraorbitomeatal line, centered to the sella turcica (coronal plane passing 3/4 inch anterior to external auditory meatus). Centers film to central ray. Directs central ray to enter the median sagittal plane of the throat between the angles of the mandible and the sella turcica. May immobilize head with tape placed on the chin and anchored to the sides of the table or film holder.

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e. For semiaxial PA projections (anterior view) of the paranasal sinuses, performer notes area of interest and whether Granger sinus mask or similar face rest will be used.

i) For semiaxial PA projection of the frontal anterior ethmoid and maxillary (antra) sinuses using a sinus mask, performer positions patient and equipment as in (b,iv), above,with angle block at a 23° caudal angle. Directs central ray vertically to a point midway between the infraorbital margins.

ii) For a semiaxial transoral projection of the sphenoid sinuses, has patient assume a seated erect or prone PA position. For prone positioning, prepares cassette on a caudally inclined angle block covered with sanitary, radiolucent paper. Performer has patient rest after adjusting film and central ray angulation, and repositions only when ready to make exposure. Has patient rest nose and chin firmly on cassette, with

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median sagittal plane vertical. Has patient open mouth wide. Centers to the open mouth. Directs central ray along a line connecting the sella turcica to the center of the open mouth at the median sagittal plane. Just before exposure performer immobilizes head. Has patient open mouth as wide as possible and practice phonating the sound "ah-h." Rechecks position of head.

f. For oblique projections of the paranasal sinuses, performer notes areas of interest and whether bilateral views are ordered.

   i) For an oblique projection of ethmoid, frontal, and sphenoid sinuses, performer has patient assume seated or prone PA position. Has patient rest head on the zygoma, nose and chin. Centers unmasked half of film to the orbit on the side of interest. Adjusts flexion of head so the acanthiomeatal line is parallel with the transverse axis of the film. Adjusts rotation so that the median sagittal plane forms an angle of 53° with the plane of the film. Directs the central ray at right angles to the midpoint of the film, entering at the upper parietal region. After first exposure positions other side of film to the opposite orbit and sets up similarly.

   ii) For an inferosuperior oblique projection of the floor of the antrum showing its relationwhip to the teeth, performer has patient assume prone or seated position with head resting on horizontally placed cassette. Has patient extend chin and rest on chin, nose, and

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zygoma. Centers the region of the antrum on the side of interest to the unmasked half of the film. Directs central ray to midpoint of film at 25° to 30° cephalad, entering just behind the angle of the jaw on the uppermost side. After first exposure positions other side of film and patient similarly for view of opposite side.

13. If, during positioning, patient shows signs of severe pain, performer may notify appropriate physician at once and await orders, or may decide on alternative positioning to avoid movement of the affected part.

14. Performer checks final positioning using triangles, protractor and light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size (or the size of the unshielded area of the film to be exposed). Uses cross-hair shadows as reference for center of field. Uses the collimator light to center the patient to the x-ray field, or centers the part to the film holder and uses the collimator light to center the tube to the part. Rechecks angulation of head and central ray. Checks that the primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired. May readjust tube position lengthwise or crosswise to provide better centering.

15. Once the patient has been positioned and immobilized, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or

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collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). For small fields (if not already done in positioning) performer attaches an auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the part(s) of interest.

16. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that proper protective shielding has been provided to patient and everyone who will remain in room.

17. Throughout procedure performer observes patient for any signs of emergency and/or to prevent or respond to an accident. Is alert to signs of nausea, dizziness, or sweat suggesting faintness. Performer may have patient lie down, lower head, or raise legs. Notifies nurse. If patient shows any other emergency signs, loses consciousness, or has an accident, performer calls appropriate physician or staff member at once. May decide to provide emergency first aid as well. If a patient's catheter becomes disconnected, performer clamps it and immediately notifies nurse. If catheter should come out, notifies staff member at once.

18. When everything is ready for the exposure, performer reviews with patient what breath control will be used for exposure:

    a. Performer has patient hold breath until told to relax by performer for all projections except as follows:

       For semiaxial transoral projection of the sphenoid sinuses, performer has patient open mouth wide and softly phonate the sound "ah-h" during the exposure as rehearsed. Rechecks position and angulation.

    b. Reminds patient about those positions which are to be maintained for a second exposure.
    c. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

19. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to breathe as instructed by calling or using intercom. Performer initiates exposure by pressing hand trigger or exposure control button.

    a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
    b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction, may decide to report; anticipates need to repeat exposure.
    c. With phototimer notes whether backup timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure (due to underexposure if premature cut-off, or overexposure due to faulty timer).
    d. After exposure is completed tells patient that he or she can relax.
    e. If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

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20. Performer returns to patient. Removes cassette or film holder from table, floor, or bucky.

   a. Removes any markers for further use. If bilateral views are to be taken on the film, removes leaded rubber mask and remasks all but next area to be exposed.
   b. If requested, performer arranges to have the first exposure(s) processed at once and brought to the appropriate radiologist or viewed wet in darkroom.
   c. If the first radiograph(s) are preliminary (scout) films, or are to be viewed wet, performer brings the processed radiograph(s) directly to the radiologist in charge,places on view boxes and/or arranges to have viewed in darkroom; informs radiologist that the radiographs are ready. If the radiologist indicates that there is any problem with the technical factors, processing, or patient positioning, performer records or notes for later use in the examination and/or repeats preliminary radiography as ordered.
   d. Depending on whether radiologist will evaluate radiographs before completion of all possible exposures for the series, performer arranges to process film(s) and evaluate for quality control personally, have this done, or bring to darkroom for processing and later evaluation, based on time available, institutional arrangements, or specific instructions. Attaches ID card for use with flasher if appropriate. May sign requisition.
   e. While films are being processed and/or evaluated,performer has patient relax in examination room or holding area. Explains what will happen next.

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      i) Performer determines whether patient should remain on table and/or in room or requires observation. May consult requisition sheet or attending RN. If appropriate, makes sure that patient will be attended while waiting.
      ii) If appropriate, moves x-ray tube and any protruding film holder away from patient before patient rises.
      iii) May decide to assist patient to chair or stretcher or from table. Makes sure patient is reminded of any footrest in stepping off table.

21. When (or if) performer learns from the radiologist whether further conventional views and/or positions can be undertaken, eliminated or altered, performer proceeds as appropriate according to instructions.

   a. For further exposures performer repeats appropriate steps for next view(s) including identification of film holder or cassette and use of R-L marker, selection and setting of technique for next view (if different), positioning patient and equipment for focus-object-film alignment, proper collimation and shielding, breathing instructions, and making exposure, as described above. For bilateral exposures on one film, keeps R-L reference constant; centers using the point marked earlier on the cassette.
   b. Performer refrains from commenting on the films or providing any interpretation.
   c. If performer is asked to repeat any exposures, makes sure that the additional exposures are warranted

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medically, since additional radiation will be incurred.

i) Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."
ii) If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member.
iii) If request for retakes reflects the preference for density or contrast of a radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.

d. Performer may arrange to have the full set of processed radiographs reviewed by a radiologist so that any additional views required can be made at once.

22. When performer is sure that the examination has been completed, performer may have patient transported back to holding area or next location, or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient as described above.

23. Performer carries out termination steps for the examination:

a. Performer has equipment and examination table cleaned after use or decides to do personally, depending on institutional arrangements.
b. Performer records the examination according to institutional procedures. May include date, room, examination type, the views taken, the technical factors used and film sizes; may record the number of exposures made of each view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. If any views called for in the initial request could not be obtained, performer may record reasons. Signs requisition sheet.
c. If performer will only carry out preliminary "scout" filming and another technologist will continue with examination, performer records the approved technical factors used for the scouts, and the accessories employed, or informs technologist who will continue. Performer gives the requisition sheet, name card, and any notes to technologist who will continue with procedure.
d. Performer may decide to jacket films, requisition sheets, and related materials and/or have information recorded in log book personally or have this done, depending on institutional procedures.
e. May indicate to appropriate staff person when the performer is ready to proceed with next examination.

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1. **What is the output of this task? (Be sure this is broad enough to be repeatable.)**

Requisition reviewed;pt. reassured,positioned;parts measured;films identified;technical factors selected and set;head immobilized;exposures made;radiographs sent for processing and evaluation;procedures repeated as appropriate for full set of views;patient returned;examination recorded;radiographs placed for use.

2. **What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)**

Pt.'s x-ray requisition sheet,ID card,ID bracelet, technical history;pen;x-ray machine control panel(s), tube,table,collimator,extension cones;technique chart;charts for conversion of technique,standard examination views,dosage,tube capacity;cassette or non-screen film holders;periapical dental film holders; upright film holder;leaded rubber shielding;R-L and ID markers;immobilization devices;head clamp;weighted band;tape;chair;calipers;protractor;scissors; film changing tunnel;stretcher or wheelchair

3. **Is there a recipient, respondent or co-worker involved in the task?** Yes...(x) No...( )

4. **If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.**

Non-infant patient to be radiographed;radiologic technologist;radiologist;nurse

5. **Name the task so that the answers to questions 1-4 are reflected. Underline essential words.**

Taking preliminary localization radiographs of foreign bodies in orbit or eye of non-infant patient by reviewing request;reporting observed contraindications;reassuring pt.;measuring part;selecting and setting technical factors;identifying film;positioning pt. and equipment for seated or recumbent exposure;providing shielding;collimating;making exposure; having radiographs processed and reviewed;repeating for full set of views or as ordered;having pt. returned;placing radiographs for use;recording examination.

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Performer receives or obtains the x-ray requisition form, patient's identification card, and any appropriate medical-technical history for a non-infant patient scheduled for preliminary radiographic localization of foreign bodies in the orbit or eye:

a. After checking assignment on schedule sheet.
b. From co-worker.
c. After having arranged requisitions in order of priority.

The plain film may serve as preliminary "scouts" for more specialized procedures using special equipment.

1. Performer reads the requisition sheet to determine the examination called for, purpose, the patient involved, special considerations, and to check the completeness of the information provided:

    a. Performer checks the examinations called for including the method to use, the suspected location of the object(s), the patient positions and views called for, the number of exposures and the central beam angulation. Notes whether there will be several views on a single film, whether the use of a grid will be involved. Checks the name of the referring physician.

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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b. Performer reads patient's name, identification number, sex, age, and weight. Notes whether patient is in-patient, out-patient, accident or emergency patient. Notes any special information that will affect patient positioning, technique, or handling of the patient, such as presence of accident injuries, unhealed or suspected fracture, degenerating disease, whether patient will be on a stretcher or wheelchair, and the nature of any known pathology which would affect technique.

c. With patients with accident injuries or unhealed fractures, performer may make sure that a surgeon or radiologist is available to position the patient; checks whether rotation and/or extension of head is contraindicated.

d. Performer checks whether patient is suffering from a collateral condition requiring special handling,such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter or similar device in place;notes whether patient will be accompanied by nurse or other staff person.

e. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved. Goes to examination room or control room for machine involved. Checks that proper shockproof equipment is available in room for use in direct contact with patient.

f. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete. Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

g. Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used,and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether number of radiographic exposures ordered or done in past should be brought to radiologist's attention.

h. Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus. Notes shielding needed.

i. If referring physician has requested that films already on file be sent with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer notifies supervisor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

3. When performer is clear about what will be involved in examination, he or she prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Performer reviews the technique chart for the machine to be used and takes note of any newly posted

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changes in technical factors (to reflect accomodation for change in machine output or a policy decision).

b. Performer washes hands as appropriate; may decide to arrange for or carry out isolation or decontamination techniques.

c. Performer goes to control panel for x-ray generator. Makes sure that x-ray equipment is ready for use.

d. Performer checks that appropriate devices such as head clamp, weighted band, cassette tunnel, protractor, mattress, pads, pillows, leaded rubber shielding and gloves are available in room.

e. Performer prepares for identification of the films using equipment provided by institution:
   i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving patient identification information.
   ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
   iii) Checks identification against requisition sheet.
   iv) Performer makes sure that right (R) and left (L) markers are available for use.

4. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

   a. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

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b. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary.

c. Has patient assume a comfortable position seated on table or chair. If patient is in wheelchair, moves patient in chair into position next to table. If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move patient to table.

d. Performer explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

e. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains when asked medical questions that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

f. If appropriate and not already done, questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, informs appropriate physician and proceeds only with approval.

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g. If not already done, has patient remove dentures, hair pins, spectacles, and any jewelry from head and neck and has all garments removed down to below the neck.

5. Performer questions patient and/or RN or MD to determine what positions are available for use.

   a. If patient is an accident victim and arrives on stretcher or bed, performer plans for radiographic positioning of film and x-ray tube with patient on stretcher and without rotating head or torso.
   b. Notes whether patient can assume erect seated positions for projections where this is an option or whether recumbent position is preferable, such as with cardiac patients.
   c. Performer may consider a change from standard projections to better accomplish the purpose of the examination, or deletion of a position, or a change in technical factors. Depending on institutional arrangements, performer may obtain permission from appropriate radiologist or decides personally to alter the standard procedure.

6. Depending on institutional practices, performer selects speed and type of film, grid, and film holder combination:

   a. Selects size(s) based on area to be included, and whether several views are to be exposed on a single film.
   b. Performer makes sure that an adequate supply of nonscreen or cassette holders and/or periapical dental films of the types and sizes selected are available in the examination room. If not, arranges to obtain or decides to obtain personally.

7. Performer prepares for the examination:

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   a. Performer obtains the appropriate size loaded film holder for the first projection.
   b. If more than one exposure will be made separately on one film, performer mentally decides how these will be positioned so that the film need not be turned for viewing each image. Performer uses leaded rubber sheets and masks the cassette completely except for the area to be exposed. Treats the area to be exposed as though it were the actual film size.
   c. Attaches identification information to the film holder or packet:
      i) Places right or left marker on film holder as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.
      ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of holder or packet.
      iii) If patient identification information is to be entered by use of flasher, sets flashcard aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.
      iv) Performer may place patient's card into card tray if equipment has automatic film marker.
   d. Performer places film holder in appropriate final position in upright film holder or on table top, or places for later use.
   e. Performer provides patient and everyone who will remain in room during exposure with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

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8. Performer has patient assume a comfortable recumbent or seated position, depending on the positions to be employed, so that the relevant skull dimensions can be measured. Makes sure that wheelchair is in locked position if patient is to be positioned in it.

    a. If appropriate, places mattress, pillow, or clean linen on x-ray table.
    b. Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way and may be collided with by patient.
    c. If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.
    d. Performer uses centimeter calipers to measure the thickness of the part(s) to be radiographed in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors.
    e. After measuring, has patient rest in as relaxed a position as possible. May place pad, blanket or pillow under bony prominences to provide comfort.

9. Performer selects the exposure factors for the first projection by consulting the technique chart(s) posted for the machine:

    a. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other accessories.
    b. Makes note of the kVp, mA, T(seconds of exposure time), focal spot size, and the focal film distance (TFD or FFD) called for.
    c. Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for a pathological condition, change in TFD, preference of the radiologist involved, and any other conversion needed. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate.
    d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

10. Performer sets exposure factors as selected:

    a. Enters control room. Makes sure that indicator light shows that x-ray generator is ready for use. Makes sure that all circuits have been stabilized.
    b. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.
    c. Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.

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d. Performer selects and sets the exposure time that will produce the mAs desired.

e. Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

f. Depending on the equipment, may set controls to provide for use of manual tableside adjustment of table and tube height, position, and of collimation unless these have already been set.

g. Performer returns to overhead unit and sets the focal-film distance (if not already done). Operates controls or manually moves the x-ray tube into place over the film holder. Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.

h. Supplies leaded glove to patient if patient will hold periapical film in place.

11. Performer prepares the part to be radiographed in the position selected for the first (or next) exposure.

a. May explain or demonstrate to patient what is required. May obtain help in positioning or has MD position in accident and fracture cases.

b. Performer positions patient by first positioning body and then positioning head. In positioning body, performer proceeds as follows:

i) For PA positioning, prone or seated, performer arranges body so that its median sagittal plane is centered to the midline of table or film holder. Has seated patient face film holder with weight distributed evenly on both buttocks.

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ii) For lateral views places median sagittal plane of body parallel with midline. Supports elevated parts if supine.

iii) Has semiprone patient rest on forearm and flexed knee of elevated side and supports ankles and flexed knee.

iv) Has prone patient flex elbows, place arms in a comfortable position. Supports ankles. Rests patient's head on forehead and nose. May have patient rest hands beneath chest.

v) If patient is thin, and will be in recumbent position, performer may elevate chest so that cervical vertebrae are at correct level.

vi) Performer positions obese patients in seated erect position unless otherwise prescribed. Uses film holder in vertical or horizontal position if possible.

vii) For all positions arranges shoulders to lie on a single transverse plane.

c. In positioning head, performer refers to standard reference lines. Has patient relax muscles of neck and then moves head gently into position.

i) Performer defines the orbitomeatal line for reference by finding the line connecting the external auditory meatus and the outer canthus of the patient's eye.

ii) Performer defines the median sagittal plane of the skull by referring to the sagittal line connecting nasion, acanthion and symphysis menti (mental point).

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d. Performer immobilizes skull with a head clamp or a weighted band and rechecks angulation and position. Uses extension cone in direct contact with head for immobilization (as well as for proper collimation).

e. Performer centers part and keeps the long axis of the part parallel to the film holder. Centers patient to midline. With film holder on table top, centers film to part. With upright holder, adjusts height of holder to part and centers part to film. May obtain help in positioning.

f. In setting tube angulation performer measures the angles between the central ray and reference lines on patient's skull. Checks skull rotation by measuring the angle between the horizontal plane or the vertical central ray and the median sagittal line.

12. Performer positions as follows:

a. For a preliminary examination, performer plans to make lateral, PA and bone-free projections unless otherwise specified. Notes whether PA projection is to be done in forehead-nose or chin-nose position. For bone-free projections prepares periapical dental films.

i) For lateral projection, performer has patient assume semiprone or erect seated position with outer canthus of the eye of interest next to film. Centers midpoint to the outer canthus. Adjusts head so that median sagittal plane is parallel with the plane of the film. Directs central ray at right angles to the film through the outer canthi. Immobilizes head as described. Performer rehearses patient in keeping a steady gaze fixed at an object directly in front of patient.

ii) For PA projection (anterior view), has patient assume prone or erect position with head on film holder, resting on forehead and nose or chin and nose. For forehead-nose position, centers film about 3/4 inch distal to the nasion. Adjusts head so that its median sagittal plane and the orbitomeatal line are at right angles to the plane of the film. Directs central ray through the center of the orbits at 30° caudad. Immobilizes head and rehearses patient in closing eyes and concentrating on holding them still for the length of the exposure.

For chin-nose position, centers film at the level of the center of the orbits. Adjusts head so that the median sagittal plane is at right angles with the plane of the film. Directs central ray at right angles to film through the mid-orbits. Immobilizes head and rehearses patient in closing eyes and holding them still as described above.

iii) For bone-free projections performer notes whether eyeball will be directed straight forward, vertically up and down, or horizontally right and left.

For lateral bone-free projection, performer has patient assume seated or supine position. Eases corner of periapical film packet and places film diagonally in the space between the inner canthus of the affected corner of the eye and the nose,

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on the affected side. Adjusts so that the plane of the film parallels the median sagittal plane of head. Has patient hold in position and adjusts. Directs central ray at right angles to the film through the outer and inner canthi. Immobilizes head. Rehearses patient in fixing gaze at an object directly ahead, or directly above or below, depending on requisition, without moving head, and holding until told to relax. For further exposures maintains head in same position; replaces film packet and has patient direct gaze in appropriate opposite direction.

For superoinferior bone-free projection, performer has patient assume seated or supine position. Places periapical film packet against the lower eyelid of the side of interest between inferior margin of the orbit and the eyeball, or diagonally under the inner or outer part of the eyeball. Has patient hold film with firm pressure so that plane of film is at right angles to median sagittal plane of head. Directs central ray at right angles to the plane of the film, passing just anterior to the superior margin of the orbit, midway between the inner and outer canthi. Immobilizes head; instructs patient in gazing directly ahead, or to the right or left, and holding gaze, as described above.

b. For parallax motion studies, performer plans to make two lateral and two PA projections with eyeball in different positions. Uses film changing tunnel.

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i) For lateral parallax projections, performer adjusts patient in erect or semiprone position, with head resting on film-changing tunnel on side of interest. Centers unmasked half of film to outer canthus of affected eye. Adjusts head and central ray as in (a,i) above. Rehearses patient in fixing gaze at an object directly above (cephalad), without moving head, and holding until told to relax. For next exposure centers other side of film as above and has patient direct gaze directly below (caudad), and hold.

ii) For PA parallax projections, performer adjusts patient in chin-nose position on film-changing tunnel as described in (a,ii), above. Centers and directs central ray as in (a,ii). Rehearses patient in fixing gaze at an object to the extreme right without moving head and holding until told to relax. For next exposure centers other side of film as above and has patient direct gaze to the extreme left, and hold.

13. If, during positioning, patient shows signs of severe pain, performer may notify appropriate physician at once and await orders.

14. Performer checks final positioning using triangle or protractor and light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size (or the size of the unshielded area of the film to be ex-

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posed). Uses cross-hair shadows as reference for center of field. Uses the collimator light to center the patient to the x-ray field, or centers the part to the film holder and uses the collimator light to center the tube to the part. Rechecks angulation of head and central ray. Checks that the primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired. May readjust tube position lengthwise or cross-wise to provide better centering.

15. Once the patient has been positioned and immobilized, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). If not already done in positioning, performer attaches an auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the part(s) of interest.

16. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that protective shielding has been provided to patient and everyone who will remain in room.

17. Throughout procedure performer observes patient for any signs of emergency and/or to prevent or respond to an accident. Is alert to signs of nausea, dizziness, or sweat suggesting faintness. Performer may have patient lie down, lower head, or raise legs. Notifies nurse. If patient shows any other emergency signs, loses consciousness, or has an accident, performer calls appropriate physician or staff member at once. May decide to provide emergency first aid as well. If a patient's catheter becomes disconnected, performer clamps it and immediately notifies nurse. If catheter should come out, notifies staff member at once.

18. When everything is ready for the exposure, performer reviews with patient what immobilization control will be used for exposure:

    a. Performer has patient gaze straight ahead until told to relax as rehearsed for lateral view, and for bone-free projections if so requested.
    b. Performer has patient close eyes and concentrate on holding them still until told to relax as rehearsed for PA projection.
    c. For bone-free and parallax motion studies has patient fix gaze on an object directly above or below or to extreme right or left as appropriate, without moving head. Has patient hold gaze until told to relax, as rehearsed.
    d. Reminds patient about those positions which are to be maintained for the next exposure.
    e. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

19. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to hold position and gaze as instructed by calling or using intercom. Performer initiates exposure by pressing hand trigger or exposure control button.

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- a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
- b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction, may decide to report; anticipates need to repeat exposure.
- c. After exposure is completed tells patient that he or she can relax.
- d. If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

20. Performer returns to patient. Removes packet or film holder from table or patient's hand.

- a. Removes any markers for further use. If more than one view is to be taken on the film, removes leaded rubber mask and remasks all but next area to be exposed.
- b. If so requested, performer arranges to have the first exposure(s) processed at once and brought to the appropriate radiologist.
- c. If the first radiograph(s) are preliminary (scout) films, performer brings the processed radiograph(s) directly to the radiologist in charge or places on view boxes and informs radiologist that the scout (s) are ready. If the radiologist indicates that there is any problem with the technical factors or the patient positioning, performer records or notes for later use in the examination and/or repeats preliminary radiography as ordered.
- d. Depending on whether radiologist will evaluate radiographs before completion of all possible exposures for the series, performer arranges to process film(s) and evaluate for quality control personally, have this done, or bring to darkroom for processing and later evaluation, based on time available, institutional arrangements, or specific instructions. Attaches ID card for use with flasher if appropriate. May sign requisition.
- e. While films are being processed and/or evaluated performer has patient relax in examination room or holding area. Explains what will happen next.

    - i) Performer determines whether patient should remain on table and/or in room or requires observation. May consult requisition sheet or attending RN. If appropriate, makes sure that patient will be attended while waiting.
    - ii) If appropriate, moves x-ray tube and any protruding film holder away from patient before patient rises.
    - iii) May decide to assist patient to chair or stretcher or from table. Makes sure patient is reminded of any footrest in stepping off table.

21. When (or if) performer learns from the radiologist whether further conventional views and/or positions can be undertaken, eliminated or altered, performer proceeds as appropriate according to instructions:

- a. For further exposures performer repeats appropriate steps for next view(s) including identification of film holder and use of R-L marker, selection and setting of tech-

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nique for next view (if different), positioning patient and equipment for focus-object-film alignment, proper collimation and shielding, immobilization instructions, and making exposure, as described above. For more than one exposure on one film, keeps R-L reference constant.

b. Performer refrains from commenting on the films or providing any interpretation.

c. If performer is asked to repeat any exposures, makes sure that the additional exposures are warranted medically, since additional radiation will be incurred.

   i) Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."
   ii) If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member.
   iii) If request for retakes reflects the preference for density or contrast of a radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.

22. When performer is sure that the examination has been completed, performer may have patient transported back to holding area or next location, or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient as described above.

23. Performer carries out termination steps for the examination:

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a. Performer has equipment and examination table cleaned after use or decides to do personally, depending on institutional arrangements.
b. Performer records the examination according to institutional procedures. May include date, room, examination type, the views taken, the technical factors used and film sizes; may record the number of exposures made of each view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. If any views called for in the initial request could not be obtained, performer may record reasons. Signs requisition sheet.
c. If performer will only carry out preliminary "scout" filming and another technologist will continue with examination, performer records the approved technical factors used for the scouts and the accessories employed, or informs technologist who will continue. Performer gives the requisition sheet, name card, and any notes to technologist who will continue with procedure.
d. Performer may decide to jacket films, requisition sheets, and related materials and/or have information recorded in log book personally or have this done, depending on institutional procedures.
e. May indicate to appropriate staff person when the performer is ready to proceed with next examination.

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1. **What is the output of this task?** (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured;breasts measured; films identified;technical factors selected or set; pt. positioned;compression applied;exposures made; mammograms sent for processing or xeroradiographs processed;mammograms taken to radiologist;additional or repeat exposures made as ordered;pt. returned; examination recorded;mammograms placed for use.

2. **What is used in performing this task?** (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, technical history;pen;x-ray machine control panel(s), tube,table,collimator;mammography and extension cones;compression devices;film holder stands; stool;technique chart;charts for conversion of technique,standard views for examinations,dosage,tube capacity;loaded nonscreen film holders;leaded rubber shielding;R-L and ID markers;scissors;protractor; calipers;wedge sponges;xeroradiograph conditioner, processor,storage boxes,cassettes,plates;marking pen;B.B.shot;radiolucent tape or adhesive;gown;radiolucent wrap material;adhesive remover;cotton;stretcher or wheelchair

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant conditions; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-infant patient to be radiographed; radiologist

5. **Name the task** so that the answers to questions 1-4 are reflected. Underline essential words.

Taking mammograms (radiography or xeroradiography) of non-infant patient by reviewing request;reporting observed contraindications;reassuring pt.;positioning pt.;applying compression cone;measuring part; selecting and setting technical factors;identifying film;positioning equipment for erect and recumbent exposures;providing shielding;collimating;making exposures;having mammograms processed or processing xeroradiographs;reviewing;taking to radiologist;continuing and/or repeating as ordered for full set of views;having pt. returned;placing mammograms for use; recording examination.

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Performer receives or obtains the x-ray requisition form, patient's identification card, and any appropriate medical-technical history for a non-infant patient scheduled for mammography (radiography or xeroradiography of the breast):

a. After checking assignment on schedule sheet.
b. From co-worker.
c. After having arranged requisitions in order of priority.
d. From attending radiologist.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided:

   a. Performer notes whether examination is routine check-up or to investigate suspected pathology. Notes views ordered, whether standard and/or special projections. Notes location of any suspected pathology and side of interest, whether bilateral views are called for. Checks the name of the referring physician.
   b. Notes any special requirements such as focal spot size, use of compression device, or other radiographic accessories.
   c. Performer reads patient's name, identification number,sex,age,height and weight.

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information that would affect technique, such as presence of breast scars, severe benign disease, whether there is known pregnancy, lactation, history of prior pregnancies, presence of silicone prosthesis. Notes any conditions affecting positioning, suspension of respiration or immobilization such as cardiac or respiratory disease, presence of injuries, whether patient will be on a stretcher or in a wheelchair. Notes shielding needed.

d. Performer checks whether patient is suffering from a collateral condition requiring special handling, such as communicable or infectious condition, infirmity, incoherence.

e. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved. Checks that the machine to be used has a fractional focal spot of appropriate size, and that all added filters have been removed from the x-ray beam column.

f. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete. Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

g. Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether number of radiographic exposures ordered or done in past should be reported.

h. Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus or that an explicit decision has been made to radiograph a pregnant female.

i. If referring physician has requested that films already on file be sent with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer notifies supervisor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

3. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

   a. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

   b. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of

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condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

c. Has patient assume a comfortable position seated on table or chair. If patient is in wheelchair, moves patient in chair into position next to table. If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move patient to table.

d. Performer explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

e. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or apprehensive. Performer explains when asked medical questions that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

f. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs appropriate physician and proceeds only with approval.

g. If not already done, has patient remove any clothing or jewelry down to below waist. Makes sure that the breast region is free of any body powder. If not already done, provides patient with open front gown. Allows patient to cover up until ready for examination, positioning and/or exposure. Accords young patient as much privacy as adult.

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4. Performer informs attending radiologist when patient is ready to be examined. May introduce patient to radiologist.

5. While patient is being examined, performer prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Performer reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).

   b. Performer washes hands as appropriate; depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.

   c. Performer checks that x-ray and/or xeroradiography equipment is ready for use. Goes to control panel(s) and checks that indicator light(s) shows that machine(s) are "warmed up," or turns on main switch as appropriate to equipment and allows time for machine(s) to "warm up." If appropriate, performer may set radiography mode selector and set collimator control for manual operation.

   d. If appropriate, performer prepares compression device for use. May inflate a rubber balloon and place inside compression cone. Shapes balloon with plastic tape. May attach styrofoam device to cone or attach mammography cones to beam column. Decides on size by observing size of patient's breast during examination.

   e. Checks that there is leaded rubber shielding available in room to be

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used to protect the patient, and/or to place beneath the film holder, as appropriate.

f. Performer prepares for identification of the films using equipment provided by institution:

   i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.

   ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.

   iii) Checks identification against requisition sheet.

   iv) Performer makes sure that right (R) and left (L) markers are available for use.

6. When radiologist has completed examination of patient, performer notes any additional orders on views to obtain decided by radiologist. If orders are given orally, makes sure that these are recorded on requisition sheet with signature as appropriate.

7. When performer is clear about what will be involved in examination, he or she continues with preparation for examination:

   a. Performer notes whether patient can be examined in the standard body positions called for with the projections ordered; if not, plans to substitute alternative body positions to achieve the same projections.

   b. Performer notes the type of breast tissue involved for determination of exposure factors by observation and from chart. Considers dense

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tissue technique for immature breast, pregnant woman, lactating woman, severe benign disease, palpable mass near the skin, abnormally thick skin. Considers patient's age, size of breast, number of children borne by female patient, firmness of breast tissue. Considers low density technique for elderly female patients, those with three or more children, with pendulous breasts, fatty tissue,or atrophic patients and those with silicone prosthesis. Notes technique for male breast if appropriate.

   c. Performer may question patient, observe breasts and palpate breasts in determining firmness and appropriate technique. Performer determines whether the patient will be unable to suspend motion and/or respiration during exposure. If so, plans to modify exposure technique to compensate.

   d. For standard examination performer plans on bilateral study of the breasts in right-angle mediolateral and craniocaudal positions. May include axillary view(s). Checks requisition for other special views required or requested by radiologist.

   e. Performer considers the number and types of projections ordered for the examination and the patient's condition. Performer may consider a change from standard positioning to better accomplish the purpose of the examination, addition of a position, or a change in technical factors. Depending on institutional arrangements, performer may obtain permission from appropriate radiologist or decides to alter the standard procedure based on institutional guidelines.

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f. Depending on institutional practices, performer selects speed and type of nonscreen film, nonscreen holders, prepacked mammography films or xeroradiography cassette and charged plate. Selects size(s) based on the area(s) to be included, the size of the patient's breasts, and whether bilateral views are to be exposed on a single film or plate.

g. Performer makes sure that an adequate supply of loaded nonscreen film holders or mammography packets of the types and sizes selected are available in the examination room.
For xeroradiography, checks that empty cassettes are available in designated holder and that sufficient plates are stored in the conditioner. If needed materials are not available, arranges to obtain or decides to obtain personally.

h. If radiologist has attached small lead shot over any palpable masses, scars, or suspicious area, performer checks to make sure that no puckering of the skin has occurred. If so, eases the tabs to release the puckering, being careful not to alter placement of pellet.
If performer has been asked to use B.B. shot to localize a given palpable lump, scar or designated area, performer finds location, attaches lead shot on skin at location using radiolucent tape or adhesive glue as appropriate.

i. Performer provides patient and everyone who will remain in room during exposure with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

8. Performer has patient assume a comfortable recumbent, standing or seated position, depending on the positions to be employed, so that the relevant breast dimensions can be measured. Makes sure that wheelchair is in locked position if patient is to be positioned in it.

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a. If appropriate, places mattress, pillow, or clean linen on x-ray table.

b. Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way and may be collided with by patient.

c. If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.

d. Performer positions patient as for final positioning (as described in step 11, below). Has patient remove gown above waist. Applies selected breast compression cone or extension cone and breast compression device as appropriate:

    i) If using mammography compression cone, performer selects size according to patient's breast size, and chooses length suitable for prescribed focal-film distance (FFD). May use extension cone for longer FFD.
    ii) Performer makes sure that breast is firmly supported and adjusts for right-angle views so that nipple is directed straight forward in an exact profile position. Applies support and compression to smooth out any wrinkling or puckering of the skin.
    iii) Centers mammography or extension cone over the breast with flat side in contact with the chest, just above the base of the breast.

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- iv) Adjusts FFD so that the field of exposure extends about 3/4 inch beyond the periphery of the breast.
- v) For a compression study of tumor-bearing areas, performer selects cone of smallest diameter possible. Performer places cotton or gauze on the breast and then applies gentle pressure with the cone, directly covering the area of interest.
- vi) Notes FFD obtained for use in determining exposure factors.
- vii) Checks that pressure is not uncomfortable.

e. Performer uses centimeter calipers to measure the thickness of the breast(s) to be radiographed in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors.

f. After measuring may release compression and have patient rest in as relaxed a position as possible. May place pad, blanket or pillow under bony prominences to provide comfort.

9. Performer selects the exposure factors for the first projection by consulting the technique chart(s) posted for the machine (and/or for use with xeroradiography).

   a. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed, focal spot size, FFD, and use or nonuse of other accessories.

   b. Makes note of the kVp, mA, T(seconds of exposure time), focal spot size, and the focal-film distance (TFD or FFD) called for or obtained with compression.

   c. Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for a pathological condition, breast type, change in TFD, unavoidable movement by patient during exposure, preference of the radiologist involved, and any other conversion needed. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate.

   d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output.

10. Performer sets exposure factors and prepares film or xeroradiography plate as follows:

    a. Enters control room. Makes sure that indicator light shows that x-ray generator is ready for use. Makes sure that all circuits have been stabilized.

    b. As appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.

    c. Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.

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d. Performer selects and sets the exposure time that will produce the mAs desired.

e. Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

f. Depending on the equipment, performer may set controls to provide for use of manual tableside adjustment of table and tube height, position, and of collimation.

g. If using xeroradiography equipment, performer obtains an empty cassette from the storage container; goes to conditioner and selects the level of image contrast desired as appropriate to the type of breast, with higher contrast for more dense tissue. Inserts cassette in conditioner slot (with green dot facing up). When indicator light shows that plate has been electrostatically charged, performer obtains "loaded" cassette from machine.
If using conventional radiography, performer obtains the appropriate size loaded nonscreen film holder or mammography film packet.

h. Performer attaches identification information to the cassette, film holder packet or table top as appropriate:
  - i) Places right or left marker on film holder or table top as appropriate to the study and projection,or depresses appropriate R or L button for automatic marking.
  - ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of film holder or xeroradiography cassette.
  - iii) If patient identification information is to be entered by use of flasher, sets flash card aside for later use with space created by piece of leaded rubber on appropriate edge of film holder or xeroradiography cassette.
  - iv) Performer may place patient's card into card tray for equipment using automatic film marking device.

i. Performer places film holder or xeroradiography cassette in position on table, film holder stand, or in receptacle as appropriate for final positioning. May place lead sheet under nonscreen film holder.

j. For views to be taken without use of compression, performer sets the focal-film distance as required. Uses controls or manually moves the x-ray tube into place over the film holder or at appropriate angle. Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.

11. Performer prepares the patient in the position selected for the first (or next) exposure. May explain or demonstrate to patient what is required. May obtain help in positioning. Has patient drop gown to below the waist.

a. For mediolateral projection (lateral view) of the breast, performer notes side of interest (unless bilateral views are ordered). Has patient assume a semilateral position on table on the side of interest. Has patient rest head on pillow with chin extended. Places arm on side of interest at right angles to body with elbow flexed and hand next to pillow.
  - i) Performer places film holder or xeroradiography cassette

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on raised support stand under breast or, if a table level window is used with film holder placed beneath, places patient over window and supports breast with wedge sponge.

ii) Rotates body so that it is in lateral position with nipple of breast in exact profile. Adjusts patient or film holder so that the entire breast and axilla are included in field, and enough of chest wall to show the retro-mammary tissues.

iii) If using flexible nonscreen holder, has about an inch of film project over support stand on the side next to patient so that it curves in close contact with chest wall. If using xeroradiography cassette on support stand, makes sure that cassette is placed well under breast so that a portion of the rib cage is included in the field.

iv) Checks that there is no wrinkling of the skin on the underside of the breast.

v) If mammography compression cone and/or extension cone is to be used, applies compression as described earlier in (8,d), above. Brings flat side of cone to a point just above sternum.

vi) Makes sure that cone serves to keep opposite breast retracted or has patient retract opposite breast with fingertips. Makes sure that fingers are not superimposed over any area of breast on side of interest.

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vii) Directs central ray at right angles to the film, centered to the central portion at the base of the breast.

viii) If bilateral views are requested, has patient reverse position and sets up similarly for second exposure.

ix) Performer rehearses patient in maintaining position without moving or respirating for the length of the exposure so that patient can prepare to hold breath without moving for required amount of time.

b. For craniocaudal projection (caudal view) of the breast(s), performer notes side of interest, whether bilateral views are ordered. Has patient take erect seated or standing position before an adjustable film stand or seated at end of x-ray table on adjustable stool.

i) Adjusts height of stand or stool so that lower border of breast is at the level of the film on stand or table top.

ii) Performer places the flexible film holder or xeroradiography cassette beneath the breast being examined with the edge firmly against the chest wall.
Extends the breast to be radiographed on the film holder so that a complete profile of breast and nipple is extended and centered over the film surface.

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iii) Has patient hold back straight and turn head as far as possible away from the side of interest.

iv) Performer adjusts level of film so that breast is completely supported, retracted away from the chest wall, with all skin folds or wrinkles eliminated, and so that nipple is in exact profile.

v) If using flexible nonscreen film holder, has about an inch of film project over the support stand on the side nearest patient so that it fits against chest wall. Has patient grasp stand to keep film pressed firmly against the body. If using xeroradiography cassette,has patient use one hand or two, resting on table or stand, to press cassette tightly against chest wall and hold.

vi) If mammography compression cone and/or extension cone is to be used, applies compression as described earlier in (8,d), above.

vii) Directs central ray at right angles to the film,centered to the midpoint of the breast.

viii) If radiography of opposite side is ordered, sets up opposite breast similarly for second exposure.

ix) Performer rehearses patient in suspending respiration as described in (a), above.

c. For caudocranial projection (cranial view) of the breast, performer directs x-ray tube in caudocranial direction and attaches mammography extension cone.

i) Covers orifice of cone with radiolucent wrap material so that it is held tautly in place and serves as a support stand.

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ii) Attaches film holder or xeroradiography cassette to vertical holder so that the plane of the film is parallel with the plane of the covered orifice of the cone.

iii) Positions patient and film as in (b), above, and applies appropriate pressure on breast between cone and film. Continues as in (b), above.

d. For axillary projection of the breast, performer notes side of interest (unless bilateral views are ordered). Notes degree of abduction ordered for upper arm on side of interest.

i) Has patient lie in a supine position on table,and rotates body 30° to 35° towards the side of interest.

ii) Has patient rest head on pillow with chin extended. Places arm on side of interest so that upper arm is abducted about 120° or as ordered, with elbow flexed. Has patient drop opposite arm back posteriorly.

iii) Performer places film holder or xeroradiography cassette on table top or table-level holder below window so that its long axis is parallel to the sternomanubrial joint. Centers about 2 inches distal to the apex of the axillary fossa, with the humeral head occupying the upper margin of the film or cassette.

iv) Allows the breast to hang unsupported. Makes sure that opposite breast is retracted.

v) Performer applies cone of appropriate diameter. Directs central ray at right angles to center of plane of film, passing through superior portion of breast.

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- vi) If bilateral view is requested, has patient reverse position and sets up similarly for second exposure.
- vii) Performer rehearses patient in suspending respiration as described in (a), above.

e. For lateromedial projection (medial view) of the breast, performer notes side of interest. Performer has patient assume a semilateral position on table on the side opposite the side of interest. Has patient rest head on pillow with chin extended.

- i) Places arm on side next to table in a comfortable forward extended position. Has patient abduct and hyperextend arm on the side of interest.
- ii) Performer places sufficient support under the breast to be examined to reduce thickness of breast and eliminate all skin folds. Uses pillows, stand or wedge sponge. Places flexible nonscreen holder or xeroradiography cassette on a support under the medial side of breast.
- iii) Positions body and breast so that nipple is in exact profile and cassette or film holder is pressed against chest wall.
- iv) Continues to position as in (a), (iii) through (vi).
- v) Directs central ray at right angles to the film, centered to the base of the breast at a point a little above the nipple.
- vi) Performer rehearses patient in suspending respiration as described in (a), above.

f. For caudal-exaggerated projection of the lateral half of the breast, performer notes side of interest. Has patient take erect seated or standing position before an adjustable film stand or seated at end of x-ray table on adjustable stool.

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- i) Adjusts height of stand or stool so that lower border of breast is at the level of the film on stand or table top.
- ii) Places flexible film holder or xeroradiography cassette beneath the breast being examined.
- iii) Rotates patient's trunk about 20° so that axillary portion of the breast on the side of interest is brought onto the area of the film.
- iv) Moves edge of film holder or cassette firmly against the chest wall and extends breast on film holder so that nipple is in exact profile.
- v) Continues to position as in (b), (iv) through (vi).
- vi) Directs central ray to the base of the breast, entering midway between the nipple and the axillary fold.
- vii) Performer rehearses patient in suspending respiration as described in (a), above.

g. For caudal-exaggerated projection of the medial half of the breast, performer positions as in (f), above except as follows:

- i) Has patient thrust chest forward and rotate trunk 10° to 15° so that the medial quadrant of the breast is included on the film surface; has patient rotate head towards the side of interest.
- ii) Directs the central ray to the base of the breast, entering at a point slightly medial to the nipple line.

h. For tangential and localized spot films of the breast, performer reviews location of areas of interest or refers to B.B. shots placed on breasts by MD or self.

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- i) Arranges and supports patient so that the area of interest (lesion) on the breast is as nearly at right angles to the film or xeroradiograph cassette as possible.
- ii) Directs central ray at right angles to the lesion or as directed.
- iii) Rehearses patient in suspension of respiration as appropriate.

12. If, during positioning, patient shows signs of severe pain, performer may notify appropriate physician at once and await orders, or may decide on alternative positioning to avoid movement of the affected part.

13. Performer checks final positioning:

    a. Makes sure that as much of the breast as possible will be included in the image field, or that localized area designated is in the field.
    b. Checks that the nipple of the breast is in profile (except for special non-right angle projections).
    c. Checks that the breast tissue is smooth and there are no folds of breast tissue.
    d. Checks that sufficient even, comfortable compression of the breast has been accomplished.
    e. If not using direct compression, activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size (or the size of the unshielded areas of the film to be exposed). Uses cross-hair shadows as reference for the center of the field. Uses the collimator light to center the breast

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to the x-ray field, or centers the part to the film holder and uses the collimator light to center the tube to the part. Rechecks angulation of body and central ray. Checks that the primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired. May readjust tube position lengthwise or crosswise to provide better centering.

14. If a breast cone is not being used, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film, or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). Adjusts primary beam to minimum size needed to cover the part(s) of interest.

15. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that protective shielding has been provided to patient and everyone who will remain in room.

16. Throughout procedure performer observes patient for any signs of emergency and/or to prevent or respond to an accident. If patient shows any emergency signs, loses consciousness, or has an accident, performer calls appropriate physician or staff member at once. May decide to provide emergency first aid as well.

17. When everything is ready for the exposure, performer reviews with patient the breath control to be used for exposure:

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a. Performer has patient hold breath and hold still until told to relax by performer.
b. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

18. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to hold breath as instructed by calling or using intercom. Performer initiates exposure by pressing hand trigger or exposure control button.

    a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
    b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction, may decide to report; anticipates need to repeat exposure.
    c. After exposure is completed tells patient that he or she can relax.
    d. If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

19. Performer returns to patient. Removes xeroradiography cassette or film holder from table or film holder.

    a. Removes any markers for further use.
    b. If appropriate, performer arranges to have the first or standard set of exposure(s) processed at once and brought to the appropriate radiologist.

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20. If nonscreen x-ray film is being used, performer arranges to process film(s) and evaluate for quality control personally, have this done, or bring to darkroom for processing and evaluation. If appropriate, may arrange to have films processed manually, or decides to do personally. Attaches ID card for use with flasher if appropriate. May sign requisition.

21. If xeroradiography is being used, performer processes the exposed plate as follows:

    a. Performer places the exposed plate (in its cassette) into the appropriate slot of the xeroradiography processor (red dot facing up).
    b. Selects the development mode (positive) and waits for the required number of seconds while the plate is processed.
    c. Removes processed xeroradiograph from receptacle and inspects for debris, artifacts and quality. If there are problems with the quality of the xerograph, performer decides to make any adjustments that seem appropriate.
    d. Removes empty cassette when it is released and replaces in cassette holder.

22. While films are being processed and/or evaluated performer has patient relax in examination room or holding area. Explains what will happen next.

    a. Performer determines whether patient should remain on table and/or in room or holding area. If appropriate, makes sure that patient will be attended while waiting.
    b. If appropriate, moves x-ray tube and any protruding film holder away from patient before patient rises.

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   c. May decide to assist patient to chair or stretcher or from table. Makes sure patient is reminded of any footrest in stepping off table.

23. Performer brings the processed mammogram(s) directly to the radiologist in charge or places on view boxes and informs radiologist that they are ready. Presents xeroradiographs directly to radiologist without light source.

   a. If the radiologist indicates that there is any problem with the technical factors or the patient positioning, performer records or notes for later use in the examination and/or repeats procedure as ordered.
   b. When (or if) performer learns from the radiologist whether further conventional views and/or positions are to be radiographed or special projections made, performer proceeds as appropriate according to instructions.
   c. For further exposures performer repeats appropriate steps for next view(s) including identification of film holder or xeroradiography cassette, and use of R-L marker, selection and setting of technique for next view (if different), positioning patient and equipment for focus-object-film alignment, proper compression, collimation, and shielding, breathing instructions, making exposure, and processing, as described above.
   d. Performer refrains from commenting on the films or providing any interpretation.
   e. If performer is asked to repeat any exposures, performer notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."

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      i) If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member.
      ii) If request for retakes reflects the preference for density or contrast of the radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.
   f. Performer shows second set of radiographs to radiologist when processed and proceeds as described above until radiologist indicates that examination is completed.

24. When performer is sure that the examination has been completed, performer may have patient transported back to holding area or next location, or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient as described above.

25. Performer carries out termination steps for the examination:

   a. If B.B. shot has been applied to patient's breast(s), removes gently or applies appropriate remover for the adhesive used.
   b. Performer has equipment and examination table cleaned after use or decides to do personally, depending on institutional arrangements.
   c. Performer records the examination according to institutional procedures. May include date, room, examination type, the views taken, the technical factors used and film sizes; may record the number of exposures made of each view including retakes; may enter the estimated

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radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. If any views called for in the initial request could not be obtained, performer may record reasons. Signs requisition sheet. d. Performer may decide to jacket films, requisition sheets, and related materials and/or have information recorded in log book personally or have this done, depending on institutional procedures. e. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

TASK DESCRIPTION SHEET

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1. **What is the output of this task?** (Be sure this is broad enough to be repeatable.)

Portable x-ray equipment selected or evaluated for examination ordered; equipment assembled, transported, set up at bedside; completed requisition obtained; procedure selected; equipment disassembled and returned to storage after use.

2. **What is used in performing this task?** (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Order for bedside radiography;requisition sheet; pt.'s ID information;pen;portable x-ray equipment; technique chart;charts for conversion of technique, standard examination views,dosage,tube capacity;loaded cassettes or nonscreen film holders;upright film holder;leaded rubber shielding;R-L and ID markers; immobilization devices;cassette tunnel;tape;calipers;protractor;triangles

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. **If "Yes" to q. 3:** Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Nurse in charge of pt.;any pt. to be radiographed; co-worker;radiologist or referring MD

5. **Name the task** so that the answers to questions 1-4 are reflected. Underline essential words.

Preparing, transporting, setting up and returning mobile portable radiography equipment for bedside radiography by selecting appropriate equipment;preparing equipment and materials for use; transporting; setting up as appropriate for needs of examination and safety; checking for appropriate requisition and orders; deciding on radiography procedure; dismantling and returning equipment after use.

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Performer receives or obtains a special record of an order for bedside radiography,or a requisition form with patient's identification card:

a. As regular assignment.
b. After checking assignment on schedule sheet.
c. From co-worker.
d. After having arranged requisitions in order of priority.

1. Performer reads the special order or requisition to determine the examination called for, the patient involved, location in the hospital,age, and referring physician.

    a. Performer checks the examination called for and the patient's age and sex to determine the probable views to be obtained and the likely positioning and exposure technique to be required. May consult chart listing standard examination views. Checks name of referring physician.

    b. If the information is available, performer notes why bedside radiography is required so as to consider limitations on patient positioning, technique, and/or need to obtain assistance in positioning. Notes whether patient is in traction, is critically ill, is post-operative, has a cardiac condition, is receiving respiration

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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or oxygen therapy, or requires isolation to prevent contamination of others, or to prevent exposure of patient to contamination.

c. Performer notes any special request such as for magnification, stereoscopic views. Notes patient's location in hospital or institution.

2. If the institution has a variety of mobile equipment available, performer may consider which unit is most appropriate for the examination ordered, taking account of the exposure technique required, the likely flexibility needed in positioning the patient, and the line voltage available in the patient's location. May consult available information on power supply in various locations of hospital. Compares needs of examination with output capacities, tube limits, and power supply needs of equipment.

   If the institution has only one type of mobile equipment, performer considers whether its rating limitations and the power source are compatible with the requested examination, taking account of the factors described above.
   If magnification has been requested, performer checks that the machine to be used has a fractional focal spot of appropriate size for direct magnification technique (i.e. 0.3 mm or smaller).
   If there is a problem, performer consults appropriate supervisor or physician and follows any orders given.

3. Once the mobile equipment is selected (or predetermined) performer prepares the equipment and collects all the materials needed for transportation to the patient's bedside. Goes to appropriate storage area.

   a. If unit is battery operated, checks that batteries are charged. If not already done, performer assembles tube stand of unit and device to measure target film distance as appropriate to equipment.

   b. Performer collects appropriate accessories depending on the examination requested and the equipment to be used. May check technique chart for unit.

      i) Performer makes sure technique chart, tube capacity chart for the given unit, and charts for conversion technique are included with materials or attached to unit.
      ii) Performer collects calipers, immobilization devices (such as sandbags, angle blocks, tape, head clamp, weighted band), protractor, cardboard triangles, cassette tunnels, localizer devices, cassette stands and other devices as appropriate for the examination and the patient's condition. Places in carrier.
      iii) Collects appropriate leaded rubber shielding and aprons to be used to protect patient, based on sex and positions, and for performer and others in room, and/or to mask or place beneath film holder. Places in carrier.
      iv) Makes sure that appropriate grounding cord and remote control exposure cord are attached.

   c. Depending on the equipment, examination, condition of patient and standard institutional practices, performer selects speed and type of x-ray film, grid, and cassette combinations.

      i) Selects size(s) based on the area(s) to be examined, whether there is order for use of magnification technique.

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List Elements Fully	List Elements Fully

ii) Performer loads an adequate supply of loaded cassettes of the types and sizes selected in appropriate container on mobile unit.

d. Performer prepares for identification of the films:

i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.

ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.

iii) Checks identification against requisition sheet.

iv) Performer makes sure that right (R) and left (L) markers are available for use.

v) Loads identification materials on carrier.

e. If referring physician has requested that films already on file be sent with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered to referring physician.

4. If not already done, performer may decide to test the equipment to make sure that it is functioning. Checks for proper filter in x-ray beam. For patients to be protected from contamination, performer may decide to wipe all the equipment with appropriate antiseptic. Washes hands as appropriate.

5. If appropriate, performer may arrange to have another co-worker assigned to assist in positioning or in isolation and decontamination procedures. May decide to carry out appropriate isolation and decontamination procedures.

6. When the equipment and materials have been assembled, performer prepares the equipment for transporting to patient.

a. Adjusts x-ray tube in storage position. Makes sure that tube, collimator and arm are in position where they cannot fall and locks into position.

b. Performer stores all cables and cords in box provided or gathers up and secures into place on carrier.

c. Makes sure that all movable projecting or looming parts are centered and not projecting out from machine.

7. Performer transports the equipment and order for radiography to the patient's location. Performer makes sure he or she has a firm hold on and good control of the machine. Walks on right side of corridors; moves slowly and with care when going around corners and up and down ramps.

8. Performer reports to nurse in charge of floor or ward on arrival.

a. Indicates patient to be examined and determines exact location of patient.

b. If appropriate, arranges for assistance with patient positioning and/or isolation technique.

c. Performer asks about specific precautions in dealing with patient. May record. Asks about patient care equipment which must remain in place and be taken account of in setting up radiography unit.

TASK DESCRIPTION SHEET (continued)

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List Elements Fully | **List Elements Fully**

9. Performer greets patient before wheeling in x-ray machine. Checks patient's identity. Introduces self and explains what will be involved in the procedure; indicates what cooperation will be asked of the patient. Answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains when asked medical questions that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

10. Performer determines where the portable machine can be placed, considering the care being given patient, such as traction, oxygen, IV drip, nasal tubing, suction apparatus, etc.

    a. Performer closes door or draws curtains to provide patient with privacy after wheeling unit into room.
    b. Places machine so that a patient to be moved can be positioned without dislodging any apparatus, or so that x-ray tube can be positioned above or below patient's bed. Is careful not to collide with patient's bed or apparatus.
    c. Makes sure that there is adequate room for required target (focal spot)-to-object (patient) distance and target-to-film distance.
    d. Makes sure that performer will be able to stand minimal required distance from x-ray beam during exposure or outside of room.
    e. Locks and/or uses brakes to immobilize equipment in place.

11. If appropriate, connects power supply for which equipment is designed.

    a. May make sure that live power switch is off. Checks that line cord has attached grounding terminal and is attached to unit, or that there is proper grounding as appropriate.
    b. May connect all low voltage cables to control panel if not already done.
    c. May connect power cable to line power outlet after checking that voltage is appropriate. After machine has warmed up checks voltage reading without making exposure. If appropriate, adjusts line voltage compensator.
    d. When performer determines that machine is operating, turns off line power switch (if appropriate).

12. Once the equipment has been set up for use, performer may obtain a more detailed requisition sheet from referring physician, specifying number and type of views and patient positions. If so, performer makes sure that the request is properly authorized, that information on requisition sheet is complete. Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination. If not,contacts appropriate staff member for further information.

13. Once an approved requisition sheet is available, performer decides to carry out radiography of the affected part as appropriate,or provides another technologist with needed information.

14. When the appropriate radiography task has been completed by performer or another technologist, performer may carry out termination steps for bedside radiography:

    a. Checks that all diagnostic radiography has been completed.
    b. Makes sure that main switch is off.
    c. Disconnects power cable with attached grounding cord.

TASK DESCRIPTION SHEET (continued)

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List Elements Fully	List Elements Fully
d. Performer may clean the equipment after use. Washes hands as appropriate. e. Reports to nurse in charge that radiography is completed. f. Reassembles equipment and materials as in 3, above. g. Prepares for transporting back to radiology department as in 6, above. h. Transports as in 7, above and stores various components as appropriate. i. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

TASK DESCRIPTION SHEET

Task Code No. 370

This is page 1 of 10 for this task.

1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Requisition reviewed;x-ray equipment checked, cleaned,transported,set up in operating room;accessories assembled for use;pt.,cassette tunnels or holders,x-ray tubes positioned;part measured;cassettes identified and placed;technique selected and set;pre-operative and operative exposures made under sterile technique;processing and viewing arranged retakes made as ordered;examination recorded;equipment returned after use.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s requisition sheet,ID card;portable operating room x-ray units;control panels;electrical outlets; x-ray or polaroid cassettes;pen;cassette tunnels or holders;immobilization devices;grids;cylinder extension cones;collimators;soap;calipers;antiseptic,disinfectant solutions;cleaning cloths;sterile pillow cases or wraps;hospital cap,mask,gown,"boots";leaded shielding;ID,R-L and sequence markers;technique,exposure,positioning and tube rating charts;view boxes

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Operating room supervisor or charge nurse;supervisor; attending orthopedic surgeon;pt. to have surgery; anesthesiologist;surgical team;co-worker

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Taking operative orthopedic radiographs of any patient (such as in hip pinning) by reviewing request; assembling,checking,cleaning,transporting and setting up x-ray equipment for use in operating room; selecting and cleaning accessories;measuring part; selecting and setting technical factors;positioning tubes;indicating placement of cassette tunnels and patient on table;providing shielding;making pre-operative and operative exposures as ordered,observing sterile technique;arranging for processing and viewing by surgeon as films are processed;recording examination;returning equipment after use.

List Elements Fully

Performer receives or obtains the x-ray requisition form and identification card for a patient scheduled for operating room radiography involving hip nailing or pinning (fixation of a fractured hip or femur with hip nail or pin) or similar orthopedic surgery as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.

1. Performer reads information on the requisition sheet in order to plan for the procedure:
   a. Notes the patient's name and ID number: confirms the type of orthopedic surgery involved and the radiography ordered.
   b. Notes the operating room assigned and its location; checks the time for the scheduled surgery and, if (or as) appropriate, the time to report for preliminary preparations and pre-operative radiography. Notes name of attending surgeon and/or charge nurse or operating room supervisor.
   c. Performer considers the views likely to be required. May consult standard procedure chart. Notes the patient's age, height,

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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weight and sex for later determination of exposure technique.

d. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete.
If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to carry out radiography, notifies supervisor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate and proceeds after obtaining needed information, signature, or orders.

2. Performer determines what prior preparations will be needed, such as provision of mobile x-ray equipment and accessories, proper dress, consultation with operating room staff:

    a. Performer determines whether assigned operating room has one or more x-ray units already available, or whether one or two units must be transported to the operating room. Plans to check and clean x-ray equipment in appropriate storage area(s).
    b. Performer notes whether film processing equipment (in darkroom or polaroid processing) is available adjacent to operating room. If films must be processed in radiology department, performer makes sure that someone is assigned to pick up, process, and return radiographs to operating room as they are ready.
    c. Performer checks own clothing to make sure that undergarments, uniform and shoes are made of fabrics that comply with institutional rules for safe operating room dress.

List Elements Fully

    d. If appropriate, performer contacts operating room staff to discuss operating room safety procedures, type of grounding, possible use of explosive gases in anesthesia, and any information on timing or availability of relevant equipment.

3. Performer goes to storage location of the designated hazard-proof portable x-ray unit(s) and/or of unit(s) kept in or near nonsterile area of operating room. Cleans and checks two units needed to make simultaneous radiographs, regardless of location. (May prepare one portable unit and one operating room unit.) Washes hands before and after assembling materials.

    a. Performer checks whether each unit is hazard-proof and authorized for operating room use, is equipped with rubber casters to insulate (if room is not insulated for use with nongrounded equipment by having conductive floor with built-in electrical resistence). May check for proper filter on x-ray tube(s). May note whether light beam in collimator is not to be used with equipment due to electrical hazard.
    b. Performer prepares damp cloths with appropriate antiseptic and/or disinfectant solutions. Makes sure equipment is disconnected, and wipes equipment thoroughly to remove dirt, dust, and lint.
    c. If not already done, performer assembles tube stands of unit(s) as appropriate to equipment. Makes sure that grounding cords and remote control exposure cords are attached as appropriate.
    d. Performer may decide to test functioning of equipment. Uses electrical outlets in storage area. Se-

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List Elements Fully

lects and sets anticipated exposure technique and makes an exposure. If performer notes any possible defect in equipment reports this to supervisor and arranges to use alternate equipment.

4. Performer collects, prepares and cleans all the materials needed for transportation to the operating room. May check technique charts. Goes to appropriate storage areas:

   a. Depending on the equipment and standard institutional practices, performer selects appropriate speed and type of x-ray film, grid, and cassette (polaroid or regular) combinations.

      i) Notes whether portable cassette tunnel will be used or whether orthopedic operating table has built-in cassette holders.
      ii) Notes whether medical x-ray film or polaroid cassettes (for use with polaroid processing will be used).
      iii) Selects size(s) based on the area(s) to be included and patient's age and size.
      iv) Collects adequate supply of loaded cassettes of the types and sizes selected or decides to prepare personally. Cleans and places in appropriate container on mobile unit.

   b. Selects cylinder extension cones as small as possible in order to minimize secondary radiation. Cleans and places on carrier.
   c. Performer collects calipers, cassette tunnel(s), cassette stands or supports, and other devices as appropriate for the equipment and procedure. Cleans and places on carrier.

List Elements Fully

   d. Performer makes sure technique charts, tube capacity charts for the given units, and charts for conversion of technique are included with materials or attached to units.
   e. Collects leaded rubber shielding and aprons to be used to protect patient, performer, and others to remain in operating room. Places on carrier.
   f. Performer prepares for identification of the films:

      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
      iii) Checks identification against requisition sheet.
      iv) Performer makes sure that right (R) and left (L) markers are available for use and markers to indicate the sequence in which exposures are made.
      v) Loads identification materials on carrier.

   g. Performer makes sure that own person, uniform and shoes are clean and garments appropriate for operating room.
   h. When the equipment and materials have been assembled, checked, and cleaned, performer prepares the equipment for transporting to operating room:

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  - i) Adjusts x-ray tubes in storage position. Makes sure that tubes, collimators and arms are in position where they cannot fall; locks into position.
  - ii) Performer stores all cables and cords in boxes provided or gathers up and secures into place on carrier.
  - iii) Makes sure that all movable projecting or looming parts are centered and not projecting out from machines.

- i. Performer transports the equipment and order for radiography to the appropriate location outside of operating room. Performer makes sure he or she has a firm hold on, and good control of, the carrier. Walks on right side of corridors; moves slowly and with care when going around corners and up and down ramps.

5. Performer reports to the charge nurse or operating room supervisor (with the portable equipment if transported).

   a. Indicates name of patient and determines exact location for setting up equipment.
   b. Performer asks about specific precautions in dealing with patient. May record. Asks about any special equipment which must remain in place and be taken account of in setting up radiography units.
   c. If not already done, dons lead apron and a clean gown, cotton "boots," cap, and mask received from the charge nurse or operating room supervisor. Performer dons these before entering operating room. Washes hands as appropriate. Carries out appropriate steps to maintain the integrity of the sterile area of the operating room and does not touch patient, drapes, surgeons, scrub nurses, instrument tables or "back table."

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   d. Performer may report to anesthesia area of operating room to discuss appropriate timing of pre-operative and operative films and/or presence of any explosive gases.
   e. Performer may discuss placement of cassette tunnels or grids with operating room supervisor (if not part of operating table) so that they can be placed on table while prior preparations are being made. May give cassette tunnels to appropriate staff member and check that they are placed so that openings face the free end of the table while being part of sterile field, and that vertical holder is positioned properly.

6. If performer will be able to measure patient before he or she is anesthetized, performer greets patient before setting up equipment. Checks patient's identity. Introduces self and explains own role in the procedure. Attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and in pain. Explains the need to measure patient for radiography.

7. Before patient is draped, or cleansed, performer measures patient and sets up equipment:

   a. Performer has patient positioned in the supine, AP position. If any movement of patient is needed, arranges to have surgeon position.

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- i) Performer notes the patient's body type, whether the area of interest is heavily covered by muscle or soft fat, whether the palpation points will be easy to find.
- ii) If factors are not already known, performer uses centimeter calipers to measure the thickness of the part(s) to be radiographed in the directions in which the central rays of the x-ray beams will pass through the centered part from tube to film (anteroposterior and lateral). Records for use in determining exposure factors.
- iii) In locating iliac crest, performer is careful not to center too high by making sure not to confuse the iliac crest with the heavy muscles immediately above the crest. May have patient inhale deeply and breathe out; then palpates the point of the crest while the muscles are relaxed.

b. If performer is present when the patient is placed on table, checks that cassette tunnel and/or patient is properly adjusted so that any perineal post of the table will not interfere with lateral projection, that cassette holder is placed just above the crest of the hip and at proper angle.

c. Performer provides patient and everyone who will remain in operating room with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

d. Performer determines where the portable machines can be placed, considering the care being given patient, such as anesthesia, IV drip, etc.

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e. Performer wheels in portable apparatus being careful not to disturb any equipment or electrical cords plugged in. Does not run over cords; lifts cords when possible or asks for assistance.

f. Performer checks out equipment for use in operating room before setting up for use at operating table. Uses anticipated exposure technique:

- i) May make sure that line power switch(es) are off. Attaches line cords with grounding terminals to units or attaches proper grounding as (or if) appropriate.
- ii) May connect all low voltage cables to control panels if not already done.
- iii) May connect power cables to line power outlets after checking that voltage is appropriate. Tests equipment by selecting (for each unit) mA, kVp and time as appropriate and turning on main switch. After machines are warmed up, checks for kV readings. If appropriate, adjusts line voltage compensators.
- iv) When performer determines that each machine is operating, turns off line power switches (if appropriate).

g. Once the machines have been checked, performer sets up the two x-ray units:

- i) Places machines so that one tube can be directed vertically from above and one tube can be directed across the table from the unaffected side. Checks that tubes can be adjusted to

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required distances (focal-object distance, FOD, and focal-film distance, FFD).

  - ii) Makes sure that performer will be able to stand minimal required distance away from x-ray beams during exposure (behind shielding).
  - iii) Locks and/or uses brakes to immobilize equipment in place and moves overhead tube out of the way until needed.

8. Performer places cassettes and preselects exposure techniques before patient is draped:

   - a. Performer obtains the two appropriate size loaded cassettes for the first simultaneous projections (AP and lateral).
   - b. Performer attaches identification information to the cassettes:
     - i) Places right or left marker on cassettes or cassette holders as appropriate. Attaches markers to indicate that these are the first in a series of exposures.
     - ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of cassettes or cassette holders.
     - iii) If patient identification information is to be entered by use of flasher, sets flash card aside for later use with space created by piece of leaded rubber on appropriate edge of cassettes.
   - c. Performer places cassettes as appropriate in cassette tunnels or cassette holding devices that are part of table.
   - d. Performer makes sure that the x-ray units are ready for use. Checks that indicator lights shows that machines are "warmed up," or turns on main switches as appropriate to equipment and allows time for machines to "warm up."

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   - e. Performer reviews the technique charts for the machines to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).
   - f. Performer locates the information needed for the body part and projection involved for each unit according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other accessories that are possible (such as screens, grids, etc.). Makes note of the kVp, mA, T(seconds of exposure time), focal spot size, and the focal film distance called for.
   - g. Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for change in FFD, extreme fat or muscularity, preference of the radiologist or surgeon involved, and any other conversion needed. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate.
   - h. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used.

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If appropriate, performer reconverts the technique to an equivalent output.

i. Performer makes sure that all circuits have been stabilized. If appropriate, adjusts line voltage meters. Sets exposure factors:

  i) Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected for each unit.
  ii) Performer selects and sets the exposure time that will produce the mAs desired for each unit.
  iii) Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp for each unit.

9. When the equipment is ready, performer reports to surgeon in charge to have patient positioned in supine position for pre-operative radiography (taken before patient is draped). May receive final orders from surgeon on positioning of tubes or cassettes.

  a. Performer indicates what is needed in the positioning so that the part will be centered, with the long axis of the part parallel to the film holders. Has patient centered to midline of cassette tunnels or holders or has cassettes centered to the part. With the upright holder adjusts height of holder to part, centers to part, and has holder supported.
  b. If patient has a balloon catheter in place performer makes sure that the clamp is not lying over a part to be exposed or that patient is not lying on the clamp.
  c. Performer localizes the long axis of the femoral neck (especially with atypical patients or where the

List Elements Fully

extremity is not in anatomic position) by locating the anterior superior iliac spine and the upper margin of the symphysis pubis. Defines a line between them. Palpates the greater trochanter of the femur and marks a point one inch below its most prominent part. Defines a line from the point marked to the midpoint of the first line as the long axis of the femoral neck.
  d. Performer finds a point on the localization line for the long axis of the femoral neck about 2.5 inches below the midpoint of the first localizing line. Uses this as centering point for hip joint.
  e. Has patient adjusted in AP position with shoulders lying on a single transverse plane and with affected hip aligned to midline of cassette placed for AP projection. May have pelvis or hip elevated or supported.

10. Performer positions units for radiography as follows:

  a. For AP projection locates hip joint as described in (d), above. Centers to level of highest point of greater trochanter, and directs central ray vertically at right angles to film. Adjusts tube to required FFD.
  b. For lateral projection has knee and hip on unaffected side flexed and adjusted so that neither central ray will be obstructed. May have unaffected thigh placed and supported in vertical position.

    i) May have surgeon grasp the heel of the affected side, invert the foot about 15° or 20°. Performer may have patient immobilized.

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- ii) Performer adjusts cassette in holder or cassette tunnel in vertical position so that the upper border is in contact with the lateral surface of the body on the affected side, at or just above the level of the crest of the ilium. May angle the lower border away from the body so that the cassette is parallel with the long axis of the femoral neck. Locates long axis of femoral neck as described above (c).
- iii) If cassette is not in holder attached to table, performer supports cassette or cassette tunnel in place.
- iv) Performer positions x-ray tube from side opposite affected side. Places tube with its cylinder extension tube under the flexed knee on the unaffected side, directed at the affected joint.
- v) Directs central ray at right angles to long axis of the femoral neck, centered to hip joint centering point described above (d).
- vi) Adjusts the x-ray tube to the required FFD.

c. Once the patient has been positioned and immobilized, performer adjusts the collimator of the AP tube. (Does not use light beam in operating room unless it has been certified as hazard proof for use in presence of explosive gases.) Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail).

d. If not already done, performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that proper protective shielding has been provided to patient and everyone who will remain in room.

11. When everything is ready for the exposure, performer checks with surgeon or anesthesiologist on timing for the first pair of radiographs before patient is draped. Has all persons not needed in room leave during exposure.

  a. If patient is to be radiographed at this stage while conscious, performer explains to patient need for patient to hold breath when told to do so by performer and to hold still until told to relax.

  b. If patient is to be radiographed while under anesthetic, performer arranges to wait for signal from anesthesiologist that respiratory arrest has been induced.

  c. Performer checks controls of machines and walks to safe distance from tubes holding exposure controls.

  d. Performer either triggers the simultaneous exposures on signal from anesthesiologist, or tells patient when to hold breath and hold still by calling. Performer initiates both exposures by pressing hand trigger(s) or exposure control button(s) simultaneously.

    - i) While exposures are underway, performer checks that mA meters record appropriate current as set, that kVp meters dip slightly.
    - ii) May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment.
    - iii) After exposure is completed tells anesthesiologist to

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resume respiration or tells patient that he or she can relax.

12. Performer returns to patient. Removes cassettes from tunnels or cassette holders.
    a. Removes any markers for further use.
    b. Performer arranges to have the two exposures processed at once:
        i) If there is no processing equipment adjacent to operating room, performer gives cassettes to coworker for processing.
        ii) If there is a darkroom with processing equipment next to operating room or a polaroid processor, performer arranges to have cassettes processed at once or decides to do personally.
    c. Attaches ID card for use with flasher if appropriate. May sign requisition.
13. When the films have been processed, performer places these on view boxes in appropriate nonsterile area of operating suite and informs surgeon that they are ready for inspection.
    a. Performer obtains orders from the surgeon on any further radiographs to be made before the patient is draped for surgery.
    b. Notes any changes ordered for placement of cassette holders, exposure factors, centering of tubes, or position of patient. Adjusts as appropriate or has this done.
    c. For further pre-operative exposures repeats appropriate steps for next view(s) including identification of film holders or cassettes and use of R-L markers, identification of sequence, selection and setting of techniques, positioning equipment for focus-object-film alignment, proper collimation and shielding, making exposures, and arranging for processing and viewing as described above.
    d. If performer is asked to repeat any exposures, notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."
14. When the surgeon indicates that no further pre-operative films are required, performer prepares for operative radiography:
    a. Observes while parts of the x-ray equipment are draped into the surgical field.
    b. Notes or reviews procedure for placing and removing cassette from tunnel or holder from under drape while scrub nurse lifts drape (for AP projections).
    c. Checks that sterile pillowcases or wraps are available for holding cassette for lateral projections.
15. During surgery, performer awaits orders from surgeon on when to take operative films as ordered.
    a. Performer identifies cassettes by patient ID, R-L and sequence number as described above.
    b. On signal, performer places cassette for AP projection in table's cassette holder or cassette tunnel by having scrub nurse lift sterile drape, uncovering the opening on non-sterile side of table. Performer inserts cassette and indicates when to allow drape to fall.
    c. Performer places cassette for lateral projection by having scrub nurse hold open a sterile wrap or pillowcase. Performer drops

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cassette into covering, being careful to maintain sterile technique and not allow cassette or own hands to touch the outside of the covering or case. Checks while nurse places covered cassette in upright holder (which is now part of sterile field).

d. Performer visually checks the cone and tube positions, collimation, and patient position. Indicates to appropriate surgical team member any adjustments needed.
e. Checks technical factors.
f. Performer coordinates with anesthesiologist on timing for exposure. Indicates when ready and when appropriate staff should leave exposure area. On signal from anesthesiologist, performer makes the next set of exposures as described above.
g. Performer arranges for removal of cassettes, processing, and viewing as rapidly as possible, as described above.
h. Performer repeats operative radiography as ordered by surgeon (as described) until told that radiography has been completed.

16. When the radiography has been completed, performer carries out termination steps:

a. Makes sure that main switch is off for each unit.
b. Disconnects power cables and grounding cords if appropriate.
c. Performer may clean the equipment after use. Washes hands as appropriate. Removes operating room garments and shielding.
d. Performer records the radiography according to institutional procedures. May include date, operating room, surgical procedure, the views taken, the technical factors used and film sizes; may record the number of exposures made of each view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment. Signs requisition sheet.
e. Performer may arrange to jacket films, requisition sheets, and related materials and/or have information recorded in log book, depending on institutional procedures.
f. Reports to supervisor or nurse in charge of operating room that radiography is completed.
g. Reassembles equipment and materials as described above. Prepares for transporting back to radiology department as described. Transports as described and stores various components as appropriate.
h. May indicate to appropriate staff person when the performer is ready to proceed with next radiographic procedure.

TASK DESCRIPTION SHEET

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This is page 1 of 9 for this task.

1. **What is the output of this task?** (Be sure this is broad enough to be repeatable.)

Requisition reviewed; x-ray equipment and accessories checked for use in operating room, cleaned, transported and set up;pt.,cassette tunnel or bucky, x-ray tube positioned;part measured;cassette identified and placed;technique selected and set;scout and contrast radiographic exposures made;processing and viewing arranged;changes made and retakes done as ordered;examination recorded;equipment returned.

2. **What is used in performing this task?** (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray order or requisition card;portable operating room x-ray unit;control panel;electrical outlets;x-ray or polaroid cassettes;cassette tunnel or bucky;immobilization devices;grid;extension cone; collimator;calipers;soap;antiseptic,disinfectant solutions;cleaning cloths;cap,mask,gown,"boots"; lead aprons,shielding;pt. ID,R-L,sequence markers; technique,exposure,positioning and tube rating charts;view boxes;pen

3. Is there a recipient, respondent or co-worker involved in the task? Yes..,(X) No...( )

4. **If "Yes" to q. 3:** Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Operating room supervisor or charge nurse;supervisor;attending surgeon;pt.to have surgery;anesthesiologist;surgical team;co-worker

5. **Name the task** so that the answers to questions 1-4 are reflected. Underline essential words.

Taking operative cholangiograms,pancreatograms or similar operative radiographs of any patient by reviewing request;assembling,checking,cleaning,transporting and setting up x-ray equipment in operating room;measuring part;positioning equipment and cassette holders and/or patient;selecting and setting exposure factors for scout and contrast films;collimating;providing shielding;observing sterile procedures;making exposures on signal;arranging for processing and viewing by surgeon;repeating as ordered; recording examination;returning equipment after use.

List Elements Fully

Performer receives or obtains the x-ray requisition form and identification card for a patient scheduled for operating room radiography such as operative cholangiography (contrast study of biliary tract during surgery), operative pancreatography (contrast study of pancreas during surgery) or similar radiography during surgery,as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.
d. Receiving emergency order to perform task after surgical procedure has begun.

1. Performer reads information on the requisition sheet or emergency order to plan for the procedure:

    a. Notes the patient's name and ID number; confirms the type of surgical procedure involved and the radiography ordered.
    b. Notes the operating room assigned and its location. Checks the time for the scheduled surgery and, if appropriate, the time to report for preparatory procedures, or notes whether surgery has begun and amount of time left to prepare and set up equipment.
    c. Notes name of attending surgeon and/or charge nurse or operating room supervisor.

OK-RP;RR;RR

6. Check here if this is a master sheet..(x)

TASK DESCRIPTION SHEET (continued)

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List Elements Fully

d. Performer notes the patient's sex, height, weight, and body type, if information is available, in order to anticipate probable exposure technique and cassette size.

e. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique, notifies supervisor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate, and proceeds after obtaining needed information or signature.

f. Performer may have request that prior radiographs be made available. If so, performer may arrange to have prior films delivered to operating room or may arrange to transport personally.

2. Performer determines what prior preparations are needed, such as provision of mobile x-ray equipment and accessories, proper dress, cooperation with operating room team:

a. Performer determines whether assigned operating room has an x-ray unit already available or whether performer will transport a mobile unit.
   i) Checks whether a Potter-Bucky diaphragm or grid-front cassettes and a cassette tunnel will be used.
   ii) Plans to check and clean equipment in appropriate storage area.

b. Performer notes whether film processing equipment (in darkroom or polaroid processing) is available adjacent to operating room. If films must be processed in radiology department, performer makes sure that someone is

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assigned to pick up, process, and return radiographs to operating room as they are made.

c. Performer checks own clothing to make sure that undergarments, uniform, and shoes are made of fabrics that comply with institutional rules for safe operating room dress.

d. Performer may contact operating room staff to receive more detailed orders, information, or to check on safety, timing or availability of equipment.

3. Performer goes to storage location for x-ray unit to be used in operating room (in radiology department or adjacent to operating room) in order to check, clean and assemble the x-ray unit. Dons lead apron.

a. Performer makes sure that unit to be used has an adequate output for the required radiography and is hazard-proof and certified for operating room use. If operating room is not insulated for use with non-grounded equipment with conductive floor, checks that unit is equipped with rubber casters.
May check for proper filter in x-ray beam, fractional focal spot size, whether light beam in collimator is hazard-proof or not to be used in operating room.
Checks whether use of bucky is compatible with safety requirements.

b. Performer prepares damp cloths with appropriate antiseptic and/or disinfectant solutions. Makes sure unit is disconnected, and wipes equipment thoroughly to remove dirt, dust and lint. If not already done, performer assembles tube stand of unit as appropriate to equipment.

c. Makes sure that ground cord and remote control exposure cord are present and properly attached.

TASK DESCRIPTION SHEET (continued)

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d. Performer makes sure technique chart, tube capacity chart for the given unit, and chart for conversion of technique are included with or attached to unit.

e. Performer decides to test the functioning of the x-ray equipment. Uses electrical outlet in storage area and phantom or test object; selects and sets anticipated technical factors. Reports defective unit and arranges to replace with alternate unit.

f. Selects and cleans appropriate extension cone(s) so that effective beam can be reduced as much as possible.

4. Performer prepares and collects all the materials needed for transportation to the operating room. Goes to appropriate storage areas. Selects and cleans appropriate accessories depending on institutional procedures and the unit to be used. May check technique chart for unit.

   a. Performer makes sure that any bucky to be used is authorized for operating room use and is padded. Cleans and prepares for transportation to operating room.

   b. Performer may prepare and clean a cassette tunnel for use instead of bucky. Places on carrier.

   c. Selects loaded cassettes of appropriate speed and type,with use of grid or not, depending on established procedures. Uses prepared polaroid cassettes if polaroid processing is to be used. Selects size based on patient's size, age and area of interest. Collects an adequate supply of loaded cassettes of the type and size selected or decides to prepare personally. Cleans and places in appropriate container on mobile unit.

   d. Performer collects and cleans appropriate lead shielding and aprons, calipers. Places on carrier.

List Elements Fully

   e. Performer prepares for identification of the films:

      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.

      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.

      iii) Checks identification against requisition sheet.

      iv) Performer makes sure that right (R) and left (L) markers are available for use and markers to indicate sequence of exposures.

      v) Places on carrier.

   f. Washes hands as appropriate before and after assembling and cleaning equipment.

5. When the equipment and materials have been assembled, checked and cleaned, performer prepares the equipment for transporting to operating room:

   a. Adjusts x-ray tube in storage position. Makes sure that tube, collimator and arm are in position where they cannot fall, and locks into position.

   b. Performer stores all cables and cords in box provided or gathers up and secures into place on carrier.

   c. Makes sure that all movable projecting or looming parts are centered and not projecting out from machine.

   d. Performer transports the equipment and order for radiography to the appropriate location outside of operating room. Performer makes sure he or she has a firm hold on and good control of the carrier. Walks on right side of corridors;

TASK DESCRIPTION SHEET (continued)

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moves slowly and with care when going around corners and up and down ramps.

6. Performer reports to the charge nurse or operating room supervisor (with the portable equipment if transported).

   a. Indicates name of patient and determines exact location for setting up equipment.
   b. Performer asks about specific precautions in dealing with patient. May record. Asks about any special equipment which must remain in place and be taken account of in setting up radiography unit.
   c. Performer may receive a clean hospital gown, cotton "boots," cap and mask from the charge nurse or operating room supervisor. Performer dons these before entering operating room. Washes hands as appropriate. Carries out appropriate steps to maintain the integrity of the sterile area of the operating room and does not touch patient, drapes, surgeons, scrub nurses, instrument tables or "back table."
   d. Performer may report to anesthesia area of operating room to discuss appropriate timing of pre-operative scout film (or operative scout if surgery has begun) and/or presence of any explosive gasses.

7. Performer wheels in portable apparatus being careful not to disturb any equipment or electrical cords plugged in. Does not run over cords. Lifts cords when possible or asks for assistance. Places machine in a convenient, easily maneuverable position before setting up at operating table.

8. Performer checks out equipment for use in operating room before setting up for use at operating table:

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   a. May make sure that line power switch is off. Attaches line cord with grounding terminal to unit, or attaches proper grounding as (or if) appropriate.
   b. May connect all low voltage cables to control panel if not already done. May connect power cable to line power outlet after checking that type of outlet and voltage are appropriate.
   c. Performer tests equipment for use at operating table:

      i) Reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).
      ii) Turns on line power switch. Selects the technical factors (mA, kVp and time) anticipated for use with patient and turns on main switch. After machine has warmed up checks for kV reading. If appropriate, adjusts line voltage compensator.
      iii) When performer determines that machine is operating, turns off line power switch (if appropriate).

9. Performer determines patient's relevant measurement for final selection of exposure technique. Checks patient's identity.

   a. If patient has not yet been placed under general anesthesia, performer greets patient before setting up equipment at operating table. Introduces self and explains own role in the procedure. Attempts to reassure patient and develop confidence.

TASK DESCRIPTION SHEET (continued)

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Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and in pain. Explains the need to measure patient for radiography.

b. If patient has been anesthetized but is not yet undergoing surgery, performer checks with anesthesiologist before measuring. Notes respiration pattern.

c. If surgery has begun, performer estimates patient's measurements based on charted information on weight, height, body type, age, and sex. Notes breathing pattern. May consult surgeon or other staff member.

d. If performer is to measure patient directly, has patient placed in supine AP position with shoulders in a single transverse plane. If any movement of patient is required, may ask to have this done.

   i) Performer notes patient's body type to judge location of biliary tract, or performer may place prior localizing radiographs on view box to judge location.

   ii) If factors are not already known, uses centimeter calipers to measure the thickness of the part to be radiographed in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film (right AP oblique projection for cholangiography and/or reflux pancreatography, and AP projection for transduodenal pancreatography). Records for use in determining exposure factors.

10. If performer is present for placement of bucky or cassette tunnel on operating table, performer checks that cassette tunnel or buckey is arranged appropriately:

    a. For cholangiography, checks that cassette, when inserted, will lie in a transverse position in relation to operating table, slightly lateral to right side. Has cassette holder placed so that opening is on the left side, away from what will be the sterile field, and so that the right upper quadrant of the patient's body can be centered to the film area.

    b. For pancreatography, adjusts so that cassette will be centered to the median sagittal plane of the patient's body at the level of the xiphoid process.

11. Performer sets up x-ray unit, after it is checked, on the left side of the table opposite the operating field.

    a. Performer determines where the portable machine can be placed, considering the care being given patient, such as anesthesia, IV drip, etc.

    b. Places machine so that x-ray tube can be directed from above and (for cholangiography) angled from left to right, at the proper focal-film distance (FFD).

    c. Makes sure that performer will be able to stand minimal required distance from x-ray beam during exposure.

    d. Locks and/or uses brake to immobilize equipment in place.

12. Performer preselects exposure technique for scout (preliminary) film unless operation is already underway:

    a. Performer makes sure that the x-ray unit is ready for use. Checks that indicator light shows

List Elements Fully	List Elements Fully
that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for machines to "warm up." b. Locates on technique chart the information needed for the body part and projection involved according to the centimeter thickness of the part as measured (or estimated) and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed, and use or nonuse of other accessories that are possible (such as screens, grids, bucky, etc.). Makes note of the kVp, mA, T(seconds of exposure time), focal spot size, and the focal film distance called for. c. Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for change in FFD, extreme fat or muscularity, preference of the radiologist or surgeon involved, and any other conversion needed or posted. Performer looks up numerical conversion factors and calculates,or uses conversion chart to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate. d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacity of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output. Keeps exposure time to a minimum. e. Performer makes sure that all circuits have been stabilized. If appropriate, adjusts line voltage meter. Sets exposure factors:	i) Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected. ii) Performer selects and sets the exposure time that will produce the mAs desired. iii) Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp. 13. Performer requests that the surgeon in charge place the patient in supine AP position for pre-operative preliminary radiography. May receive final orders from surgeon on positioning of tube or cassette. a. Performer indicates what is needed in the positioning so that the part will be centered. b. For cholangiography,has patient adjusted in AP position so that the right upper quadrant of the abdomen is centered to the bucky grid or cassette tunnel film area. i) If tube will not be angled, has left side of body elevated and supported 15° to 20°. Supports elevated shoulder,hip and knee. ii) Has hips and knees fully extended. c. For pancreatography,has patient adjusted in AP position so that the xiphoid process is centered over the bucky grid or exposure area of cassette tunnel at the median saggital plane. 14. Performer places cassette for the scout film: a. Performer obtains the appropriate size loaded cassette.

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b. Attaches identification information to the cassette or cassette holder:
   i) Places right or left marker on cassette or cassette holder as appropriate.
   ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of cassette or holder.
   iii) If patient identification information is to be entered by use of flasher, sets flash card aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.

c. If patient has already been draped, performer has scrub nurse or someone who is part of surgical team lift the drape to expose opening of bucky or cassette tunnel, and replace drape after cassette is placed.

d. If cassette is to be used with bucky performer may manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.

e. If a cassette tunnel is being used, performer places cassette in tunnel.

f. If not already done, performer provides patient, self, and everyone who will be in operating room during radiography with protective lead aprons. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

15. Performer positions x-ray tube:

a. For cholangiography, performer adjusts the x-ray tube to obtain a right AP oblique projection (RPA oblique view). Positions tube on the left side of the patient, centered to the right side, to enter the area of the biliary ductal system:
   i) If patient has been draped and surgery is in progress, performer centers to point indicated by surgeon.
   ii) If tube angulation is to be used, directs central ray to center of cassette area or indicated area at 20° to the right.
   iii) If patient has had left side elevated, performer directs central ray at right angles to midpoint of cassette or area.

b. For pancreatography, performer adjusts the x-ray tube to obtain an AP projection (posterior view). Centers tube at right angles to the midpoint of the cassette area (medial sagittal plane of body at level of the xiphoid process or as indicated by surgeon).

c. Checks and adjusts the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD is obtained.

d. Performer collimates so that a small unexposed border will appear around the edge of the film, or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). Performer may attach an auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the part(s) of interest. (Does not use light beam in operating room unless it has been certified as safe for use in presence of explosive gases.)

TASK DESCRIPTION SHEET (continued)

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e. If not already done, performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest, or has this done.

16. When everything is ready for the preliminary exposure performer checks with surgeon and/or anesthesiologist on timing. Has all persons not needed at operating table during exposure leave room.

    a. If patient is to be radiographed before being anesthetized, performer explains to patient how to hold breath without moving when told to do so by performer and hold until told to relax. Observes patient until moment that exposure is made.
    b. If patient is under anesthesia and is to be radiographed prior to surgery, performer arranges to make exposure on signal from anesthesiologist that respiratory arrest has been induced.
    c. If surgery has begun, performer arranges timing with surgeon and anesthesiologist, and waits for signal.
    d. Performer checks controls of x-ray machine and walks to safe distance from tube with exposure control (on long cord).
    e. Tells patient when to hold breath by calling, or notes anesthesiologist's signal. Initiates exposure by pressing trigger of exposure control cord.
        i) While exposure is underway, performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
        ii) May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment.

List Elements Fully

        iii) After exposure is completed indicates to anesthesiologist that respiration can be resumed, or tells patient that he or she can relax.

17. After exposure performer returns to patient. If patient has been draped, has surgical drape raised to expose cassette holder.

    a. Removes cassette.
    b. Removes any markers for further use.
    c. Performer arranges to have the scout film processed at once:
        i) If there is no processing equipment adjacent to operatint room, performer gives cassette to co-worker for processing.
        ii) If there is a darkroom with processing equipment next to operating room or a polaroid processor, performer arranges to have cassette processed at once or decides to do personally.
        iii) Attaches ID card for use with flasher if appropriate. May sign requisition.

18. When the scout film has been processed and returned, performer places on view box in appropriate nonsterile area of operating suite. May also hang prior films. Informs surgeon that radiograph(s) are ready for viewing.

    a. Notes any orders to repeat scout film and/or timing for contrast study.
    b. Performer notes surgeon's orders on any change in technical factors needed, any change in tube or cassette position, or any change to be made in centering or patient position.

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c. If performer is to repeat scout film, repeats appropriate steps as described above, including processing and review, making appropriate changes as ordered.
   i) Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."
   ii) If request for retakes reflects the preference for density or contrast of the surgeon, performer notes for future work done for the given surgeon so that retakes can be avoided.

19. Performer prepares for contrast radiography during surgery:

a. Inserts properly identified cassette into bucky or cassette tunnel under lifted surgical drape, as described above.
b. Adjusts technical factors to allow for use of contrast medium. (May check technique chart.) Sets technical factors.
c. At signal of surgeon (after instillation of contrast), performer centers tube at appropriate angle to centering point indicated by surgeon. Walks to position for exposure, and has appropriate personnel leave room.
d. At signal from anesthesiologist, performer makes exposure as described above.

20. Performer has first operative radiograph processed at once for viewing, as described above. Continues with radiography at intervals determined by surgeon, following steps as described above, until told by surgeon that radiography has been completed.

List Elements Fully

21. When the radiography has been completed, performer carries out termination steps:

a. Makes sure that main switch of x-ray unit is off.
b. Disconnects power cable and grounding cord (if appropriate).
c. Performer may clean the equipment after use. Washes hands as appropriate. Removes operating room garments and shielding.
d. Performer records the radiography according to institutional procedures. May include date, operating room, surgical procedure, the views taken, the technical factors used and film size; may record the number of exposures made of each view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment. Signs requisition sheet.
e. Performer may arrange to jacket films, requisition sheets, and related materials and/or have information recorded in log book depending on institutional procedures.
f. Reports to supervisor or nurse in charge of operating room that radiography is completed.
g. Reassembles equipment and materials as described above. Prepares for transporting back to radiology department as described. Transports as described and stores various components as appropriate.
h. May indicate to appropriate staff person when the performer is ready to proceed with next radiographic procedure.

TASK DESCRIPTION SHEET

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This is page 1 of 8 for this task.

1. **What is the output of this task?** (Be sure this is broad enough to be repeatable.)

Requisition reviewed;x-ray equipment and accessories checked for use in operating room,cleaned,transported and set up;film packets prepared for use;film packet identified and placed in sterile holder;tube positioned and exposure made;film packet removed from holder;processing and viewing arranged;changes made and retakes done as ordered;examination recorded;equipment returned.

2. **What is used in performing this task?** (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition form;portable operating room x-ray unit;control panel;electrical outlets;dental occlusal film packets or x-ray film,black paper and lead foil;scissors;tape;extension cone;collimator; soap;antiseptic,disinfectant solutions;cleaning cloths;cap,mask,gown,"boots";lead shielding;forceps; sterile film packet holders;pt. ID,R-L markers;technique, exposure,positioning and tube rating charts; view boxes;pen

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. **If "Yes" to q. 3:** Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Operating room supervisor or charge nurse;supervisor;attending surgeon;pt. to have surgery;anesthesiologist;surgical team;co-worker

5. **Name the task** so that the answers to questions 1-4 are reflected. Underline essential words.

Taking intravisceral or isolated operating room radiographs of any patient by reviewing request;assembling,checking,cleaning,transporting and setting up x-ray equipment in operating room;preparing small size film packets;placing in sterile packet-holder following sterile technique;adjusting x-ray tube;selecting and setting exposure factors;collimating; checking shielding;making exposure on signal;removing film packet from bloody holder;arranging for processing and viewing by surgeon;repeating as ordered;recording examination;returning equipment after use.

List Elements Fully

Performer receives or obtains the x-ray requisition form and identification card for a patient scheduled for intravisceral or isolated operating room radiography (such as isolated kidney or choledochography) as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.
d. Receiving emergency order to perform task after surgical procedure has begun.

1. Performer reads information on the requisition sheet or emergency order to plan for the procedure:

    a. Notes the patient's name and ID number; confirms the type of surgical procedure and the organ to be radiographed.
    b. Notes the operating room assigned and its location. Checks the time for the scheduled surgery and, if appropriate, the time to report for preparatory procedures, or notes whether surgery has begun and amount of time left to prepare and set up equipment.
    c. Notes name of attending surgeon and/or charge nurse or operating room supervisor.
    d. Performer notes the patient's sex, height,weight

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

TASK DESCRIPTION SHEET (continued)

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and body type, if information is available, in order to anticipate probable exposure technique and film size needed.

e. Performer makes sure that the request is properly authorized, that information on requisition is complete. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique, notifies supervisor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate, and proceeds after obtaining needed information or signature.

f. If appropriate, performer may arrange to have prior radiographs delivered to operating room or may arrange to transport personally.

2. Performer determines what prior preparations are necessary and plans to carry these out:

   a. Performer determines whether assigned operating room has an x-ray unit already available or whether performer will transport a mobile unit. Makes sure that unit to be used has an adequate output capacity for the required radiography and is hazard proof and certified for operating room use. Plans to check and clean equipment in appropriate storage area.

   b. Performer notes whether film processing equipment with capacity to handle small size film is available adjacent to operating room. If films must be processed in radiology department, performer makes sure that someone is assigned to pick up, process and return radiographs to operating room as they are made.

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   c. Performer notes whether packets of dental occlusal film or medical x-ray film cut to size and wrapped with lead foil in black paper will be used, whether sterile envelope or surgical glove will be used to hold film packet, and whether prior preparations to sterilize holders must be made with operating room staff.

   d. Performer checks own clothing to make sure that undergarments, uniform and shoes are made of fabrics that comply with institutional rules for safe operating room dress.

   e. Performer may contact operating room staff to receive more detailed orders, information or to check on safety, timing or availability of equipment, or to arrange to have film packet holders of appropriate size and quantities autoclaved and ready for surgical use.

3. Performer goes to storage location for x-ray unit to be used in operating room (in radiology dept. or adjacent to operating room) in order to check, clean and assemble the unit. Washes hands as appropriate before and after assembling and cleaning equipment.

   a. Performer makes sure that unit is hazard proof, authorized for operating room use, and, if operating room is not insulated for use with nongrounded equipment with conductive floor, whether unit is equipped with rubber casters. Checks for proper filter in x-ray beam, appropriate focal spot size; notes whether light beam in collimator is hazard-proof or not to be used in operating room.

   b. Performer prepares damp cloths with appropriate antiseptic and/or

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disinfectant solutions. Makes sure unit is disconnected and wipes equipment thoroughly to remove dirt,dust and lint. If not already done, assembles tube stand of unit as appropriate to equipment.

c. Performer makes sure technique chart and tube capacity chart for the given unit, and chart for conversion of technique are included with or attached to unit.

d. Makes sure that FFD device, ground cord and remote control exposure cord are present and properly attached.

e. Performer decides to test the functioning of the x-ray equipment. Dons lead apron. Selects and sets the anticipated technical factors; uses a phantom or test object and electrical outlet in storage area. Reports any defective unit and arranges to obtain alternate.

f. Performer selects smallest possible extension cone for reduction of effective beam to only the organ to be isolated; cleans with antiseptic or disinfectant solution.

g. Collects and cleans additional lead shielding and aprons, calipers. Places on mobile carrier.

h. Performer prepares for identification of the films:

    i) May obtain lead numerals and tape and prepare identification strip giving appropriate patient identification information for placement on film packets.
    ii) Checks identification against requisition form.
    iii) Performer makes sure that right (R) and left (L) markers are available for use and markers to indicate sequence of exposures.
    iv) Places on carrier.

4. Depending on institutional arrangements,performer may prepare x-ray film packets or obtain dental occlusal film packets:

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a. If performer is to prepare film packets,performer selects a size that will demonstrate the entire area under study (such as kidney) and small enough to be inserted in sterile holder (such as Manila envelope) in body cavity.

    i) Performer collects materials and works in darkroom under safelight.
    ii) Obtains an adequate number of x-ray films of appropriate type, speed and size. Cuts to size if necessary.
    iii) Places each individual film on lead foil backing of same size.
    iv) Wraps each film-foil unit in black paper and tapes.
    v) Marks foil side of packet for placement away from x-ray beam source.

b. If performer is to use prepared film packets or dental occlusal film packets, performer selects those of appropriate size and type as described above.

c. Places film packets on mobile carrier in clean container.

5. When the equipment and materials have been assembled, checked,and cleaned, performer prepares the equipment for transporting to operating room:

a. Adjusts x-ray tube in storage position. Makes sure that tube,collimator and arm are in position where they cannot fall and locks into position.

b. Performer stores all cables and cords in box provided or gathers up and secures into place on carrier.

TASK DESCRIPTION SHEET (continued)

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c. Makes sure that all movable projecting or looming parts are centered and not projecting out from machine.

d. Performer transports the equipment and order for radiography to the appropriate location outside of operating room. Performer makes sure he or she has a firm hold on and good control of the carrier. Walks on right side of corridors; moves slowly and with care when going around corners and up and down ramps.

6. Performer reports to the charge nurse or operating room supervisor (with the portable equipment if transported).

   a. Indicates name of patient and determines exact location for setting up equipment
   b. Performer asks about specific precautions in dealing with patient. May record. Asks about any special equipment which must remain in place and be taken account of in setting up radiography unit.
   c. Performer may receive clean hospital gown, cotton "boots," cap, and mask from the charge nurse or operating room supervisor. Performer dons these before entering operating room. Washes hands as appropriate. Carries out appropriate steps to maintain the integrity of the sterile area of the operating room and does not touch patient, drapes, surgeons, scrub nurses, instrument tables or "back table."
   d. Performer may report to anesthesia area of operating room to discuss presence of any explosive gases or timing for procedure.
   e. Checks that sterile film packet holders are available among sterile supplies.

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7. Performer wheels in portable apparatus being careful not to disturb any equipment or electrical cords plugged in. Does not run over cords. Lifts cords when possible or asks for assistance. Places machine in a convenient, easily meaneuverable position before setting up at operating table.

8. Performer checks out equipment for use in operating room before setting up for use at operating table:

   a. May make sure that line power switch is off. Attaches line cord with grounding terminal to unit, or attaches proper grounding as (or if) appropriate.
   b. May connect all low voltage cables to control panel if not already done. May check that type of outlet and voltage are appropriate and connect power cable to line power outlet.
   c. Performer tests equipment for use at operating table:

      i) Reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).
      ii) Performer locates information on chart for the organ involved according to the approximate thickness of the part and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other accessories. Makes note of kVp, mA, T(seconds of exposure time), focal spot size, and the focal film distance called for.

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iii) Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for change in FFD, preference of the radiologist or surgeon involved, and any other conversion needed. Performer looks up numerical conversion factors and calculates, or uses conversion chart to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate.

iv) Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output.

v) Performer turns on main switch. After machine has warmed up checks for kV reading. If appropriate, adjusts line voltage compensator.

vi) Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.
Selects and sets the exposure time that will produce the mAs desired.
Sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

vii) When performer determines that machine is operating, turns off line power switch (if appropriate).

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9. Once x-ray unit has been checked, performer sets it up at operating table on the side opposite the sterile field:

   a. Performer determines where the portable machine can be placed, considering the care being given patient, such as anesthesia, IV drip, etc.
   b. Places machine so that x-ray tube can be directed easily and at the proper focal-object distance (FOD) and focal-film distance (FFD).
   c. Makes sure that performer will be able to stand minimal required distance from x-ray beam during exposure.
   d. Locks and/or uses brake to immobilize equipment in place.
   e. Performer makes sure that the x-ray unit is ready for use. Checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for machine to "warm up." Makes sure that all circuits have been stabilized. If appropriate, adjusts line voltage.

10. Performer attaches identification markers to the film packet(s):

   a. Places right or left marker as appropriate, in relation to foil side of packet.
   b. If patient's identification information is in the form of lead numerals, places on appropriate corner of packet.
   c. If patient identification information is to be entered by use of flasher, sets flash card aside for later use and places prepared piece of leaded rubber on appropriate edge of packet.

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d. If not already done, performer provides self and everyone who will be in operating room during radiography with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure. Checks that sterile shielding is available for use on patient within sterile field.

11. Performer indicates to surgeon when everything is ready for radiography and awaits orders to work with scrub nurse for film packet placement. Stands at nonsterile end of table. Prepares to work as quickly and efficiently as possible.

12. At the signal of the surgeon,performer takes up the first film packet to be used. As scrub nurse holds sterile envelope or surgical glove open, performer introduces the film packet into the sterile holder,being careful to avoid touching the outer parts. Indicates verbally to nurse and surgeon which side is to be placed away from the x-ray source (the foil side). With occlusal film has pebbled side facing the x-ray beam source.

13. Performer waits while surgeon inserts film packet (in holder)into incision and places in position and/or adjusts organ in front of film area.

   a. Performer then positions x-ray tube so that the central ray will be at right angles to center of film area (or at angle indicated by surgeon).
   b. Performer adjusts the required focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD is obtained.
   c. Performer adjusts the collimation so as to expose only the area of

List Elements Fully

interest (and thus provide maximum protection and detail). Performer may attach selected auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the part of interest. (Does not use light beam in operating room unless it has been certified as safe for use in presence of explosive gases.)
   d. Performer may indicate where sterile lead shielding should be placed so that areas not being studied directly will be shielded from the primary path of the beam. Has sterile gonadal shielding applied if possible.

14. When everything is ready for the exposure,performer checks with surgeon and anesthesiologist on timing.

   a. Has all persons not needed at operating table during exposure leave room.
   b. Performer checks controls of x-ray machine and walks to safe distance from tube with exposure control (on long cord).Waits for signal from surgeon or anesthesiologist.
   c. On signal from surgeon(or anesthesiologist if induced respiratory arrest is required) performer initiates exposure by pressing trigger of exposure control cord.
   d. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
   e. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment.
   f. Indicates when exposure is completed.

TASK DESCRIPTION SHEET (continued)

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15. After exposure, performer returns to operating table. Stands by to receive film packet as surgeon removes it (in holder) from patient's body and hands to scrub nurse or other member of team.

    a. As the now bloody film-packet holder is held open, performer removes film packet, being careful to keep it from contact with the blood. May use forceps.
    b. Removes any markers for further use.
    c. Performer arranges to have the film processed at once:

        i) If there is no appropriate processing equipment adjacent to operating room, performer gives film packet to co-worker for processing.
        ii) If there is a darkroom with processing equipment next to operating room, performer arranges to have film processed at once or decides to do personally.
        iii) Attaches ID card for use with flasher if appropriate.
        iv) May sign requisition.

16. When the radiograph has been processed and returned, performer places on view box in appropriate nonsterile area of operating suite. May also hang prior films. Informs surgeon that radiograph is ready.

    a. Performer notes surgeon's orders on need to "retake" radiograph or need for further radiography:

        i) Performer notes surgeon's orders on any change in technical factors needed, or any change in tube position.
        ii) Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."
        iii) If request for retakes reflects the preference for density or contrast of the surgeon, performer notes for future work done for the given surgeon so that retakes can be avoided.

    b. Performer repeats filming as ordered, carrying out appropriate steps described above, including processing and review, making appropriate changes as ordered, until told by surgeon that radiography has been completed.

17. When the radiography has been completed, performer carries out termination steps:

    a. Makes sure that main switch of x-ray unit is off.
    b. Disconnects power cable and grounding cord (if appropriate).
    c. Performer may clean the equipment after use. Washes hands as appropriate. Removes operating room garments and shielding.
    d. Performer records the radiography according to institutional procedures. May include date, operating room, surgical procedure, the views taken, the technical factors used, and film size; may record the number of exposures made of each view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment. Signs requisition sheet.
    e. Performer may arrange to jacket films, requisition sheets, and related materials and/or have information recorded in log book, depending on institutional procedures.

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TASK DESCRIPTION SHEET (continued)

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List Elements Fully	List Elements Fully
f. Reports to supervisor or nurse in charge of operating room that radiography is completed. g. Reassembles equipment and materials as described above. Prepares for transporting back to radiology department as described. Transports as described and stores various components as appropriate. h. May indicate to appropriate staff person when the performer is ready to proceed with next radiographic procedure.	

TASK DESCRIPTION SHEET

Task Code No. 373

This is page 1 of 8 for this task.

1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Requisition reviewed;x-ray equipment and accessories checked for use in operating room, cleaned, transported and set up;positioning of patient and/or cassette, cassette tunnel directed under sterile technique;cassette identified and placed;technique selected and set;tube positioned;exposure made; processing and viewing arranged;retakes made as ordered; examination recorded; equipment returned after use.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s requisition sheet,ID card;portable operating room x-ray unit;electrical outlets;x-ray or polaroid cassettes;cassette tunnel or holder;grid;extension cone;collimator;soap;antiseptic,disinfectant solutions;cleaning cloths;sterile pillow cases or wraps; hospital cap,mask,gown,"boots";leaded shielding;pt. ID,R-L markers;technique,exposure,positioning and tube rating charts;exposure control panel;view box; pen

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Operating room supervisor or charge nurse;supervisor; attending surgeon; pt. to have surgery; anesthesiologist; surgical team; co-worker

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Taking operating room radiographs for opaque foreign body search by reviewing request;assembling,checking,cleaning,transporting and setting up x-ray equipment in operating room; selecting and setting technical factors; arranging for patient and cassette placement,observing sterile technique; positioning tube; arranging for shielding; collimating; making exposure on signal; arranging for processing and viewing by surgeon; repeating as ordered; recording examination; returning equipment after use.

List Elements Fully

Performer receives or obtains the x-ray requisition form and identification card or emergency order for operating room opaque foreign body search (such as for gauze sponges,marked with barium, lost during abdominal surgery) as a result of:

a. Regular assignment.
b. Checking assignment sheet.
c. Emergency request based on availability for procedure.

1. Performer reads information on the requisition sheet or emergency order so as to plan for the procedure:
    a. Notes the patient's name and ID number; confirms the type of object and nature of the surgery involved.
    b. Notes the operating room assigned and its location; notes name of attending surgeon and/or charge nurse or operating room supervisor.
    c. Performer considers the radiographs likely to be required. Notes the patient's sex, height, weight, age,and body type, if information is available,in order to anticipate the proper exposure technique and cassette size to select.
    d. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete.

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to carry out radiography, notifies supervisor, radiologist, or other designated staff person, depending on institutional procedures. Explains the problem if appropriate and proceeds after obtaining needed information, signature, or orders.

2. Performer determines what prior preparations are necessary and what will be involved. Plans to work as rapidly and carefully as possible.

   a. Performer determines whether assigned operating room has an x-ray unit already available, or whether a unit must be transported to the operating room. Plans to check and clean x-ray equipment in appropriate storage area.
   b. Performer notes whether film processing equipment (polaroid processing or in darkroom) is available adjacent to operating room. If films must be processed in radiography department, performer makes sure that someone is assigned to pick up, process, and return radiographs to operating room as they are made.
   c. Performer determines whether the operating table in use has a built-in cassette holder or whether performer or surgical staff must prepare to insert and remove cassettes under patient using sterile covers. Checks whether a cassette tunnel or grid will be required.
   d. Performer checks own clothing to make sure that undergarments, uniform and shoes are made of fabrics that comply with institutional rules for safe operating room dress.
   e. If appropriate, performer contacts operating room staff to discuss operating room safety procedures, type of grounding, possible use of explosive gases in anesthesia, and any information on availability of relevant equipment.

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3. Performer goes to storage location of the designated hazard-proof portable x-ray unit or of unit kept in or near nonsterile area of operating room in order to check, clean and assemble the unit. Washes hands as appropriate before and after cleaning equipment.

   a. Performer makes sure that unit to be used has an adequate output capacity for the required radiography and is hazard-proof and certified for operating room use. Checks that, if operating room is not insulated for use with nongrounded equipment with conductive floor, unit is equipped with rubber casters.
   b. Checks for proper filter in x-ray beam, FFD measuring device. Notes whether light beam in collimator is not to be used with equipment due to electrical hazard.
   c. Performer prepares damp cloths with appropriate antiseptic and/or disinfectant solutions. Makes sure equipment is disconnected and wipes equipment thoroughly to remove dirt, dust, and lint.
   d. If not already done, performer assembles tube stand of unit as appropriate to equipment. Makes sure that grounding cord and remote control exposure cord are attached as appropriate.
   e. Performer decides to test functioning of equipment. Uses electrical outlet in storage area and phantom or test object. Selects and sets anticipated exposure technique and makes an exposure. If performer notes any possible defect in equipment reports this

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to supervisor and arranges to use alternate equipment.

f. Selects and cleans appropriate extension cone(s) so that effective beam can be reduced as much as possible to minimize secondary radiation.

g. Performer makes sure technique chart, tube capacity chart for the given unit, and chart for conversion of technique are included with or attached to unit.

h. Collects and cleans leaded rubber shielding and aprons to be used to protect patient, performer, and others to remain in operating room. Places on carrier.

i. If appropriate, cleans cassette tunnel and places on carrier.

j. Performer selects loaded cassettes of speed and type, with use or non-use of grid, depending on established procedures. May check technique chart. Chooses polaroid cassettes if polaroid processing will be used.

  i) Selects size based on the area to be radiographed and information on the patient's size.

  ii) Collects adequate supply of loaded cassettes of the types and sizes selected or decides to prepare personally. Cleans and places in appropriate container on mobile unit.

k. Performer prepares for identification of the films:

  i) May obtain lead numerals and tape and prepare identification strip for placement on film holder giving appropriate patient identification information.

  ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.

  iii) Checks identification against requisition sheet.

  iv) Performer makes sure that right (R) and left (L) markers are available for use.

  v) Loads identification materials on carrier.

l. Performer makes sure that own person, garments and shoes are clean and garments appropriate for operating room.

4. When the equipment and materials have been assembled, checked, and cleaned, performer prepares the equipment for transporting to operating room:

  a. Adjusts x-ray tube in storage position. Makes sure that tube, collimator, and arm are in position where they cannot fall; locks into position.

  b. Performer stores all cables and cords in box provided or gathers up and secures into place on carrier.

  c. Makes sure that all movable projecting or looming parts are centered and not projecting out from machine.

  d. Performer transports the equipment and order for radiography to the appropriate location outside of operating room. Performer makes sure he or she has a firm hold on, and good control of, the carrier. Walks on right side of corridors; moves slowly and with care when going around corners and up and down ramps.

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5. Performer reports to the charge nurse or operating room supervisor (with the portable equipment if transported).

   a. Indicates name of patient and determines exact location for setting up equipment.
   b. Performer asks about specific precautions to be taken. May record. Asks about any special equipment which must remain in place and be taken account of in setting up radiography unit.
   c. Performer dons lead apron and may receive a clean gown, cotton "boots," cap, and mask from the charge nurse or operating room supervisor. Performer dons these before entering operating room. Washes hands as appropriate. Carries out appropriate steps to maintain the integrity of the sterile area of the operating room and does not touch patient, drapes, surgeons, scrub nurses, instrument tables or "back table."
   d. Performer may report to anesthesia area of operating room to discuss appropriate timing and/or presence of any explosive gases. May check that sterile shielding is available for use with patient.
   e. Performer may discuss placement of cassette tunnel or cassette with appropriate staff member (if not part of operating table).
   f. Performer provides everyone who will remain in operating room during exposure with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.
   g. Performer determines where the portable machine can be placed, considering the care being given patient, such as anesthesia, IV drip, etc.

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   h. Performer wheels in portable apparatus being careful not to disturb any equipment or electrical cords plugged in. Does not run over cords; lifts cords whenever possible or asks for assistance.

6. Performer sets up equipment for use in operating room before placing for use at operating table

   a. Connects machine to power source:

      i) May make sure that line power switch is off. Attaches line cord with grounding terminal to unit, or attaches proper grounding as (or if) appropriate.
      ii) May connect all low voltage cables to control panel if not already done.
      iii) May connect power cable to line power outlet after checking that voltage and outlet are appropriate.

   b. Performer preselects the exposure factors for the radiography:

      i) Reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).
      ii) Locates the information needed for the area to be radiographed and projection involved according to the centimeter thickness of the part as estimated from the patient's age, height, weight and sex and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or

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nonuse of other accessories (such as screens, grids, etc.). Makes note of the kVp, mA, T(seconds of exposure time), focal spot size, and the focal film distance called for.

iii) Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for change in FFD, extreme fat or muscularity, preference of the radiologist or surgeon involved, and any other conversion needed. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate.

iv) Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacity of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output.

c. Performer turns on line power switch. After machine has warmed up, performer makes sure that all circuits have been stabilized. Checks for kV reading. If appropriate, adjusts line voltage meter.

d. Performer sets exposure factors:

i) Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.

ii) Performer selects and sets the exposure time that will produce the mAs desired for the examination.

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iii) Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

iv) When performer determines that machine is operating, turns off line power switch (if appropriate).

e. Once the machine has been checked, performer sets up the unit at the operating table opposite the sterile operating field. Makes sure not to make contact with any sterile objects or staff and keeps equipment away from sterile area.

i) Places machine so that x-ray tube can be directed easily and at the proper focal-object distance (FOD) and focal-film distance (FFD).

ii) Makes sure that performer will be able to stand minimal required distance from x-ray beam during exposure behind shielding.

iii) Locks and/or uses brakes to immobilize equipment in place.

f. Performer identifies first cassette to be used:

i) Places right or left marker on cassette as appropriate.

ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of cassette.

iii) If patient identification information is to be entered by use of flasher, sets flash card aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.

7. When the equipment is ready, performer reports to surgeon in charge to have patient moved into an appropriate

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position for radiography. May receive final orders from surgeon on positioning of tube or cassette or on area of interest.

a. If a cassette tunnel has already been placed under patient, or if table has a built-in cassette holding drawer, performer asks that sterile drape be lifted to expose the location. Performer checks whether patient or cassette tunnel has been properly centered for the projection required. Indicates any adjustments needed.
   Once placement is judged appropriate, performer has sterile drape held up to expose opening of cassette holder. Performer places cassette inside and into position. Has drape replaced.
b. If the cassette or cassette tunnel is to be placed into the sterile field, performer holds cassette or cassette tunnel while scrub nurse holds open a sterile wrap or pillowcase. Performer drops cassette or cassette tunnel into covering, or case, being careful to maintain sterile technique and not allow cassette, tunnel, or own hands to touch the outside of the covering or case. Performer directs the placement of the cassette or cassette tunnel under patient so that it is properly centered under the area of interest with correct side facing the x-ray beam source.
   If a cassette tunnel has been used, has scrub nurse expose entrance of tunnel while performer inserts and places cassette while maintaining sterile technique.

8. Once the cassette has been placed, performer adjusts the x-ray tube, being careful to avoid touching any sterile area:

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a. Directs central ray at right angles to center of area of interest or cassette, or as directed by surgeon.
b. Adjusts the x-ray tube to the required FFD by reading appropriate indicator scale; adjusts up or down until the required FFD is obtained.
c. Performer adjusts the collimation so as to expose only the area of interest (and thus provide maximum protection and detail). Performer may attach selected auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the area of interest. (Does not use light beam in operating room unless it has been certified as safe for use in presence of explosive gases.)
d. If appropriate may indicate where sterile lead shielding should be placed so that areas not being studied directly will be shielded from the primary path of the beam. Has gonadal shielding applied if possible.

9. When everything is ready for the exposure, performer checks with surgeon and anesthesiologist on timing.

a. Has all persons not needed at operation table during exposure leave room.
b. Performer checks controls of x-ray machine and walks to safe shielded distance from tube, holding exposure control on long cord. Waits for signal from anesthesiologist.
c. When anesthesiologist signals that respiratory arrest has been induced, performer initiates exposure by pressing trigger of exposure control cord.

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i) While exposure is underway, performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
ii) May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment.
iii) Indicates when exposure is completed.

10. After exposure, performer returns to operating table. Has sterile drape lifted while performer removes cassette. Leaves cassette tunnel in place if additional radiographs may be required.

    a. Removes any markers for further use.
    b. Performer arranges to have the exposure processed at once:

        i) If there is no processing equipment adjacent to operating room, performer gives cassette to coworker for processing.
        ii) If there is a darkroom with processing equipment next to operating room or a polaroid processor, performer arranges to have cassette processed at once or decides to do personally.
        iii) Attaches ID card for use with flasher if appropriate. May sign requisition.

11. When the film has been processed, performer places on view box in appropriate nonsterile area of operating suite and informs surgeon that it is ready for inspection.

    a. Performer notes any orders from surgeon for further radiography.

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    b. Notes any changes required in placement of cassette, tube position or centering, and/or technical factors.
    c. If appropriate, directs repositioning of cassette tunnel and/or carries out appropriate identification and placement of next cassette.
    d. Performer repeats filming as ordered, carrying out appropriate steps described above, including processing and review, making appropriate changes as ordered until told by surgeon that radiography has been completed.

12. When the radiography has been completed, performer carries out termination steps:

    a. Makes sure that main power switch is off for x-ray unit.
    b. Disconnects power cable and grounding cord if appropriate.
    c. Performer may clean the equipment after use. Washes hands as appropriate. Removes operating room garments and shielding.
    d. Performer records the radiography according to institutional procedures. May include date, operating room, surgical procedure, the views taken, the technical factors used and film sizes; may record the number of exposures made including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment. Signs requisition sheet.
    e. Performer may arrange to jacket films, requisition sheets, and related materials and/or have information recorded in log book, depending on institutional procedures.

TASK DESCRIPTION SHEET (continued)

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List Elements Fully	List Elements Fully
f. Reports to supervisor or nurse in charge of operating room that radiography is completed. g. Reassembles equipment and materials as described above. Prepares for transporting back to radiology department or storage area as described. Transports as described and stores various components as appropriate. h. May indicate to appropriate staff person when the performer is ready to proceed with next radiographic procedure.	

TASK DESCRIPTION SHEET

Task Code No. 374

This is page 1 of 14 for this task.

1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Requisition reviewed;patient reassured;lesion localized on plain films;tomographic equipment set up; films identified;technical factors,amplitude and layer height selected and set;patient positioned; scout tomograms taken,sent for processing,taken to radiologist;procedures repeated as ordered;patient returned;examination recorded;tomograms placed for use.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, medical and technical history,prior radiographs;view boxes;pen;paper;x-ray generator;tomographic attachment;control panel;tube,bucky,table,collimator,extension cones;technique,cooling,tube rating,and rad exposure charts;cassettes;beam filter;footrest;restraining bands;lead shielding;R-L,level and ID markers;sand bags;head clamp;weighted band;tape;centimeter scale;calipers;stool;wax marker;body marker; intercom;stretcher;wheelchair

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(x) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Patient to have tomography;accompanying adult; radiologist;anesthesiologist;co-worker

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Taking tomograms of non-infant patient by reviewing request;reporting observed contraindications;preparing equipment;reassuring pt.;localizing lesion from plain films;setting up layer height,amplitude and technical factors for scout tomograms as ordered; providing shielding;positioning pt.;collimating; identifying;exposing scout tomograms and arranging for processing;taking to radiologist;taking full set of tomograms,continuing as ordered;having pt. returned;placing tomograms for use;recording examination.

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Performer receives or obtains the x-ray requisition form, patient's identification card,and any appropriate medical-technical history for a non-infant patient scheduled for tomography (body section radiography) (except for positive contrast nephrotomography and neurologic tomography or other such contingencies of scheduled contrast studies), as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.
d. Decision of radiologist to expedite and have tomography done at once.

Depending on instititional arrangements, performer may receive frontal and lateral radiographs of the patient with record of technical factors used for use in localizing the area of interest.

1. Performer reads the requisition sheet to determine the type of tomography called for, the area of interest, the patient involved, special considerations, and to check the completeness of the information provided:
   a. Performer checks the part of the body involved, such as skull, neck, vertebrae, thoracic or abdominal area, and the specific organ. Notes the name of the radiologist in charge.

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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b. Notes whether tube-film travel pattern is specified (if more than one type of equipment is available), such as linear, circular, elliptical, or hypocycloidal tomography. Notes whether zonography is called for (exposure angle of 10° or less), whether plesiotomography is called for (simultaneous multi-level tomography using "book" cassettes). Notes whether asymmetrical tomography(incomplete linear sweep) is ordered. For linear motion checks whether vertical or horizontal drive is prescribed.

c. Performer notes the patient positions (recumbent or vertical), and views called for, the areas to be included in the central beam; notes whether the exposure angle (amplitude), speed, the number of "cuts," and the suspected level have been indicated. Notes whether performer will be expected to use prior radiographs to localize the plane of interest. If not assumed as standard procedure,notes orders for "scout" tomograms (such as one "cut" at expected plane of interest, one or more at given cm's above and/or below).

d. Performer reads patient's name, identification number, sex, age, and weight. Notes whether patient is in-patient, out-patient, accident,or emergency patient. Notes any special information on known pathology that will affect patient positioning, technique,or handling of the patient, such as presence of accident injuries, unhealed or suspected fracture, degenerating disease, whether patient will be on a stretcher or wheelchair.

e. With patients with accident injuries or unhealed fractures, performer may make sure that a surgeon or radiologist is available to position the patient; checks whether rotation and extension of affected parts is contraindicated.

f. Performer checks whether patient is suffering from a collateral condition requiring special handling, such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter, or similar device in place; notes whether patient will be accompanied by nurse or other staff person.

g. Performer notes whether the part of the body to be examined and the exposure amplitude ordered require any special precautions against unnecessary exposure of sensitive organs (such as use of shielding for eyes, gonads, positioning of patient at right angles to direction of linear tube travel, use of additional filter in beam column for hypocycloidal movement). Notes shielding needed.

h. Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether number of tomographic exposures ordered or done in past should be reported to radiologist.

i. Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.

j. If patient's record indicates orders for sedation or any other prior medication, or if anesthesia

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may be ordered for pediatric patient, performer may check timing to be sure a proper elapse of time has occurred for medication to take effect. May arrange to delay examination if appropriate.

k. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved.

l. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete.

2. If the performer determines that the request does not include suggested amplitude and level for scout tomograms, is not properly authorized,or that sufficient information is lacking for performer to set up equipment, select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer brings this to attention of radiologist in charge:

   a. Performer brings requisition sheet, patient's medical history, chart, and prior films of the area to radiologist. May display prior films on view boxes.
   b. Performer tells radiologist about any difficulties encountered with regard to information, equipment, possible contraindications,or anything else that should be brought to physician's attention. Notes any orders or change in procedure decided by radiologist. Notes whether anesthesia will be administered to pediatric patient. Proceeds after obtaining needed information, signature, or orders. May have radiologist mark area of lesion on radiographs.

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   c. If radiologist decides to cancel procedure, performer arranges to terminate and reschedule as appropriate.

3. When performer is clear about what will be involved in the tomographic examination, he or she prepares ahead so as not to keep the patient in the examination room longer than necessary:

   a. Performer washes hands as appropriate; depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
   b. Performer makes sure that x-ray equipment is ready for use. Goes to control panel for x-ray generator and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for machine to "warm up." If appropriate, performer may set radiography or tomography mode selector and set collimator control for manual operation.
   c. Performer reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).
   d. Performer checks that appropriate immobilization devices are present, and that there is a mattress, pads, pillows and/or blankets for comfort of patient.
   e. Makes sure that right (R) and left (L) markers are available for use and identification cards or leaded numerals for film identification and recording of level and amplitude.

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f. Performer makes sure that an adequate supply of loaded cassettes of the appropriate types and sizes are available in the examination room, including book cassettes if appropriate. If not, arranges to obtain or decides to obtain personally.
g. Checks that leaded rubber shielding is available for protection of patient and/or anyone to remain in room during exposure.
h. Performer prepares for identification of the films using equipment provided by institution:

    i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
    ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write out ID information on card if not received with requisition.
    iii) Checks identification against requisition sheet.

i. Performer sets x-ray table in horizontal position. If patient is to be positioned vertically, sets up footrest at end of table.
j. If appropriate, such as with wide angle hypocycloidal tomography, performer may insert additional filter (as designated) into beam column.
k. If institution has polytomography unit, sets mode corresponding to appropriate tube-film travel pattern and sets up as appropriate to mode selected.
l. If a tomography attachment is to be put in place (to be used with conventional tubemount, generator, and horizontal bucky x-ray table), performer obtains the necessary equipment and assembles:

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    i) Checks that table is in horizontal position.
    ii) Attaches fulcrum assembly along the table top rail at head end of table and secures.
    iii) Attaches fulcrum assembly plug to appropriate electrical receptacle.
    iv) Attaches the fulcrum bar and bucky link bar as appropriate to equipment and moves the tubemount over the fulcrum assembly. Adjusts so that angulation and fulcrum level indicators are facing appropriately.
    v) Slides fulcrum bar into fulcrum assembly as appropriate and locks.
    vi) Adjusts tubemount to prescribed focal-film distance. (May check technique chart for tomography.)
    vii) If vertical tomography will be used, makes sure that fulcrum bar is released and moves table into vertical position.
    viii) Moves the tomographic mechanism manually through the maximum travel and checks that there are no restrictions such as from cables or other attachments. Adjusts as appropriate.
    ix) Engages the drive mechanism for horizontal or vertical travel as appropriate and removes engaging rod. Sets lock switch if appropriate to prevent alternative travel motion.
    x) Returns table to horizontal position.

m. Makes sure that tomography power switch is off (if appropriate).
n. Washes hands again as appropriate.

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4. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.
   a. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done. Has patient under general anesthesia wheeled in under supervision of anesthesiologist.
   b. Performer greets patient (if conscious) and any accompanying staff person, and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.
   c. Performer has patient assume a comfortable recumbent supine position (unless prone position is called for and repositioning will be painful).
      i) If appropriate, places mattress, pillow or clean linen on x-ray table.
      ii) If patient is in wheelchair, may move patient in chair into position next to table. Makes sure that wheelchair is in locked position.
      iii) May decide to assist patient from wheelchair or stretcher to table or has this done; may obtain help. Makes sure that no equipment is in the way that may be collided with by patient. If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.

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      iv) If patient is on radiolucent stretcher, places stretcher into position so that stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move or have patient moved to table depending on patient's condition.
      v) If the area of the body to be tomographed is such that an extended exposure angle will expose sensitive portions of the body not being studied to primary radiation (because of the travel of the central ray parallel with the patient's body) performer may have patient lie so that the x-ray tube will move at right angles to the body: For example, if the neck or thorax is to be studied, performer may lock stretcher bed into position at same height and at right angles to x-ray table so that patient can lie on stretcher with area of interest extended over the bucky portion of the x-ray table. Assists patient into position as described above.

   d. Performer explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume, the cooperation that will be asked of the patient. Performer may manually demonstrate the action of the x-ray tube during tomography. Answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains

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aware that patient may be frightened and/or in pain. Performer explains, when asked medical questions, that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

e. If not already done, has patient remove clothing, jewelry, hair pins, spectacles, dentures, as appropriate from all areas of the body that may be exposed, down to below the area of interest. Permits patient to keep covered with gown until measurements are taken and until exposure. Treats young patient with as much courtesy as adult.

f. If patient has an IV drip in place, performer checks that needle has not become dislodged and that the fluid is dripping at an even rate. If there are any problems, performer clamps tube and notifies an appropriate staff person at once.

g. If there is a wet dressing, performer has it reinforced or decides to do personally.

h. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs radiologist and proceeds only with approval.

i. Performer questions patient and/or RN or MD present on what movement is possible to determine if the positions ordered are available for use. Notes whether injuries present require positioning by MD.

   i) Performer considers the positions ordered for the examination and the patient's condition. Performer may consider a change from standard positioning to better accomplish the purpose of the examination.

   ii) Depending on institutional arrangements, performer may obtain permission from radiologist or decides personally to alter the standard procedure.

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5. If performer has been asked to localize the suspected lesion, has patient relax in supine position; explains what will be done. Obtains wax marker, marker for use on patient's body, calipers, centimeter scale and the patient's frontal (AP or PA) and lateral radiographs. Places radiographs on view boxes. Marks the center of the suspected lesions (if not already done) on each radiograph or has done by MD.

   a. Performer works first with frontal projection. Keeps R and L sides in line with patient's current supine position. Judges how dimensions on radiograph correspond with dimensions on patient's body in area of the suspected lesion:

      i) Performer measures the distance between two topographic anatomical points near area of suspected lesion on film and then corresponding distance on patient's body.

      ii) Judges a one-to-one correspondence or determines the ratio to use to convert.

   b. On the frontal film, performer locates the marked center of the area of the suspected lesion.

      i) Locates a known anatomical point visible on the midline and marks on radiograph.

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ii) Follows the midline to the level of the lesion on radiograph and marks a point on the midline at the level of the lesion.

iii) Connects the two points on the midline. Connects the points representing the lesion and its level at the midline (forming a right angle at the midline).

iv) Performer measures the two lines (from anatomical point to level of lesion on midline, and from that point on midline to lesion). Records.

c. Performer reproduces the markings on the patient's body using washable dye.

i) Locates the known anatomical point as in (b, i), above, and marks on body.

ii) Lays off the measured distance along the midline towards the intersection with second line (using conversion ratio if necessary) and marks point on midline at level of lesion on body.

iii) Lays off (at right angles to midline), the distance to the center of the lesion (converting if necessary). Marks point which defines the anterior location of the lesion on body.

d. Performer measures the AP thickness of the patient at the marked lesion point using calipers. Records. Has patient lie in relaxed position.

e. Performer works with the lateral radiograph:

i) Performer draws a vertical line at right angles to table, passing through the visible area of the lesion (as marked).

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ii) Defines the point where the line crosses the table as zero cm.'s.

iii) Defines the point where the line crosses the patient's anterior body surface as the anterior location of the lesion.

iv) Defines the distance from zero cm. to the anterior location of the lesion as the AP distance measured in (d), above.

v) Divides the distance into four equal horizontal quarters in cm's. Locates the area of the lesion within one of the quarters so that the cm. distance to the table at, above, and below the lesion can be estimated.

f. Performer may determine the level of the initial cut (lowest probable cm.) and a second and/or third cut at somewhat higher levels, or brings marked radiographs and measurements to radiologist who determines the levels for the two or three scout tomograms.

6. When performer has the information on the number of scouts, level(s) for the scout tomogram(s), and the size of the "slice" (exposure angle or amplitude), performer prepares the equipment to make the preliminary exposure(s):

a. Performer selects the appropriate cassette size, with film and screen speeds appropriate to the equipment and the area of interest. Performer attaches identification information to the cassette or table top:

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- i) Places right or left marker on film holder or table-top as appropriate to the study and patient position, or depresses appropriate R or L button for automatic marking.
- ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of cassette.
- iii) If patient identification information is to be entered by use of flasher, sets flash card aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.
- iv) Performer may place patient's card into card tray for equipment using automatic film marking device.
- v) Performer prepares marker giving the level at which the fulcrum will be set for the given exposure and attaches to cassette or table-top as appropriate.

b. Performer places cassette into bucky tray. May manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot. Makes sure that bucky carriage is in center of bucky slot.

c. Performer sets the fulcrum (layer height) level for the first (or next) exposure:

- i) If a "book" cassette is to be used, performer sets the fulcrum level to coincide with the uppermost body layer to be projected.

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- ii) If an automatic layer height selector is available, performer sets the controls to the interval distances selected, and sets the fulcrum for the uppermost or lowermost body layer desired depending on the direction of the automatic change.
- iii) Sets the fulcrum level using hand crank or power switch and checks the setting on the fulcrum (layer height) indicator.

d. Performer sets the amplitude (sweep):

- i) Makes sure that x-ray tube is centered at zero angle. Checks focal-film distance.
- ii) Sets the prescribed exposure angle or amplitude as appropriate to equipment and checks angle on indicator.

e. Performer sets the sweep speed as prescribed, according to the speeds available for the equipment, the exposure angle selected, and established procedure for the area of interest (or patient's age). Notes the duration or actual exposure time as the product of the angle and the sweep speed selected.

f. For linear tomography, performer sets the directional control switch to right or left for horizontal travel or up or down for vertical travel depending on the direction in which the tube will travel during the actual exposure.
For asymmetrical exposure, determines whether the arc to be used will be at the beginning of tube travel or near the end, and adjusts equipment as appropriate.

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g. For other types of tube-film travel motion performer sets the selector (s) as appropriate for direction control (if any).

7. Performer selects the exposure factors for the first tomographic projection by consulting the technique chart(s) posted for the machine dealing with tomography:

   a. Locates the information needed for the body part and projection involved according to the exposure angle (amplitude), and speed selected. May first refer to conventional exposure factors in order to convert if commercial technique chart is used, or reads tomography mAs or mA and kVp directly from the technique chart.
   Makes sure that technique relates to the combination of film type and speed and use of other accessories such as screens, grids.
   b. Once the tomographic kVp and mA or mAs have been determined, performer notes whether any conversions are necessary to account for a pathological condition, unusual positioning, extreme fat, preference of the radiologist involved, and any other conversion needed such as with posted changes in technique. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factors. Multiplies, divides, adds, or subtracts as appropriate.
   c. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used.

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      i) Takes account of total heat units and checks with cooling chart. May plan pacing of exposures to allow cooling.
      ii) If appropriate, performer reconverts the technique to an equivalent output using higher kVp, lower mA, or faster sweep speed.
      iii) Performer may plan to vary the exposure technique for the scout radiographs so as to provide radiologist with visual choice for the particular patient. If so, records the planned techniques for each scout film in relation to the level of the "cut" for each.

8. Performer sets exposure factors as selected:

   a. Enters control room. Makes sure that indicator light shows that x-ray generator is ready for use. Makes sure that all circuits have been stabilized. Sets mode for tomography. Sets control for moving grid.
   b. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.
   c. For conventional exposure control:

      i) Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected.
      ii) Performer sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.
      iii) Sets backup timer at an increment slightly longer than the actual exposure time (calcu-

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lated as the product of the angle of amplitude and the sweep speed or as listed on chart).

d. For automatic phototimed exposure control:

   i) Performer selects and sets the category corresponding to the type of study and use of screens, bucky, etc., and, if appropriate, focal spot size.
   ii) Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).
   iii) May select and set a kVp range button (if called for with equipment) corresponding to range for examination.
   iv) Sets a density selector corresponding to the usual (or special) requirements for the study.
   v) Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made and sweep is completed.

9. Performer prepares the part to be radiographed in the position selected for the first (or next) tomographic exposure (unless this is done by physician):

   a. May explain or demonstrate to patient what is required. May obtain help in positioning or has MD position.
   b. Performer positions patient by first positioning body and then positioning head if necessary. In positioning body, performer proceeds as follows:

      i) For positioning patient in AP supine or PA prone position, performer arranges body so that its median sagittal plane is centered to the midline of table or stretcher.
      ii) For lateral or oblique positioning has median sagittal plane parallel with midline. Supports any elevated parts.
      iii) Has prone patient flex elbows, place arms in a comfortable position. Supports ankles. Rests patient's head on forehead and nose. May have patient rest hands beneath chest.
      iv) Has supine patient place arms in a comfortable position; supports ankles and knees.
      v) For thin patient in recumbent lateral, PA or oblique positioning, performer may elevate chest so that the cervical vertebrae are at a correct level.
      vi) With all positions arranges shoulders to lie on a single transverse plane.

   c. If positioning head, performer refers to standard reference lines. May use wax marker to draw in reference lines or points on skull or visualizes mentally. Has patient first relax muscles of neck and then moves head gently. Immobilizes skull with a head clamp or a weighted band and rechecks angulation and position.
   d. Performer centers part to midline and keeps the long axis of the part parallel to the film holder, unless patient is being positioned transversely across table to minimize unnecessary radiation exposure. May draw back mandible if throat is to be radiographed.
   e. If patient is to be radiographed in erect position (vertical tube travel), performer positions pa-

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tient on table in horizontal position. Then attaches footrest and restraining bands. Places table in vertical position just prior to exposure. Returns table to horizontal position for any change in positioning.

f. Performer positions patient in AP, PA, lateral or oblique recumbent positions as called for, following procedures as for "plain" films of the area of interest. Centers area of interest to center of film (in bucky) using light beam in collimator, cross-hair shadows as reference for center of field and by moving bucky carriage. May use automatic aligning mechanism. Immobilizes patient as appropriate.

g. If, during positioning, patient shows signs of severe pain, performer may notify radiologist at once and await orders, or may decide on alternative positioning to avoid movement of the affected part.

h. Performer rehearses patient in proper breathing for exposure such as holding breath, breathing in or out and holding, breathing regularly and shallowly and/or phonating a sound (such as high-pitched "e-e-e" for study of larynx or pharynx).

   i) Cautions patient to keep fingers away from table edges.
   ii) Advises patient to keep eyes closed to avoid following the movement of the x-ray tube.
   iii) Explains that patient must hold position for successive "cuts."

i. Performer checks that no obstructions are present which might restrict tubemount travel such as palpator or cables.

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10. Once the patient has been positioned and immobilized, performer adjusts the collimator. Collimates so as to expose only the area of interest (and thus provide maximum protection and detail). For small fields (if not already done in positioning) performer attaches an auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the part(s) of interest.

11. May add lead shielding to gonads and areas that will be in the primary path of the beam but are not included in the areas of interest. Provides shielding to eyes if any exposure of orbital area is indicated and/or small shielding over corneas. Provides everyone who will remain in room during exposure with protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

12. Performer tests tomographic set-up by proceeding with tubemount sweep but not activating exposure. Has patient practice breathing and holding still as ordered and permits patient to sense the duration time for each sweep:

    a. Turns on power for tomographic attachment or mode. Using appropriate switch, activates tomographic sweep action without activating exposure, and holds until tubemount reaches the extreme limit of travel.
    b. Returns tubemount to other extreme position, holding until tubemount travel is complete. Interrupts travel at any point and makes any adjustments necessary. Returns equipment to "start" position.

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13. When everything is ready for the exposure, performer reviews with patient the breath control to be used for exposure. Rechecks position. Reminds patient if position is to be maintained for further cuts. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

14. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to breathe as instructed by calling or using intercom. Performer initiates tubemount action and exposure by pressing hand trigger or exposure control button (twice if two-stage control is appropriate). Holds down or continues to press exposure control until tube travel is completed. Then releases exposure switch at once.

    a. For asymmetrical exposure initiates exposure or terminates at appropriate stage of tube travel.
    b. After exposure is completed tells patient that he or she can relax.
    c. If there is any problem during the exposure, performer releases switch at once and sets back to "start" position before attempting another sweep.

15. After exposure performer returns to patient. Removes cassette from bucky.

    a. Removes any markers.
    b. Performer places ID, R-L and appropriate next layer height markers on cassette for next scout (unless book cassette was used).
    c. Inserts new cassette as described.
    d. Changes fulcrum to new layer height (level) as appropriate, unless this will be done automatically.

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    e. If more than one patient position is to be used for scouts, repositions patient if appropriate.
    f. If new patient position is required that calls for change in exposure factors, or if a variety of factors are to be used, performer changes technical factors as appropriate.
    g. Performer adjusts collimation and shielding and repeats exposure for next scout tomogram.
    h. Performer continues until all scout tomogram exposures have been made.

16. Throughout procedure performer observes patient for any signs of emergency and/or to prevent or respond to an accident. If patient shows any other emergency signs, loses consciousness, or has an accident, performer calls radiologist or staff member at once. May decide to provide emergency first aid as well. If a patient's catheter becomes disconnected, performer clamps it and immediately notifies nurse. If catheter should come out, notifies staff member at once.

17. Performer arranges to have the scout tomograms processed at once or decides to do personally. Attaches ID card for use with flasher if appropriate. May sign requisition. While films are being processed, makes sure that patient is comfortable and, if necessary, attended by staff person or self.

18. Performer brings the processed scout tomograms directly to the radiologist in charge or places on view boxes and informs radiologist that they are ready. May also hang prior films. If not already done, brings

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requisition sheet and patient's medical records.

Performer notes instructions from radiologist regarding the position and the layer levels, amplitude, and number of cuts to be made for each position. Notes radiologist's preference for technical factors.

19. Depending on radiologist's orders, performer makes tomographic exposures at the selected interval cuts (amplitude) and levels required for each position ordered, as described above:

    a. Readjusts fulcrum level, technical factors, patient positioning, collimation and shielding as appropriate. Makes sure ID, R-L and layer heights are marked. Makes exposures and has tomograms processed at once as above.
    b. Brings tomograms to radiologist and displays on view boxes as before.
    c. Performer notes whether a given level will be further defined by smaller "slices"(expanded amplitude) within a more restricted area. If so, repeats procedures after adjusting amplitude and redetermining exposure techniques.
    d. Performer refrains from commenting on the films to patient or providing any interpretation.
    e. If performer is asked to repeat any exposures, performer notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."
    f. If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member.
    g. If request for retakes reflects the preference for density or contrast of the radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.
    h. Performer shows subsequent sets of tomograms to radiologist as processed, and proceeds as described above until radiologist indicates that tomographic examination is completed.

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20. Performer carries out termination steps for the examination:

    a. Turns off energy for tomographic attachment and/or unplugs.
    b. If patient has been anesthetized, checks with anesthesiologist on removal of patient. Otherwise, may have patient transported back to holding area or next location, or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient.
    c. Performer has equipment and examination table cleaned after use or decides to do personally, depending on institutional arrangements.
    d. With tomographic attachment, disassembles by reversing the attachment procedures.
    e. Performer records the examination according to institutional procedures. May include date, room, examination type, the views taken, the amplitude, speed, layer heights and technical factors used and film sizes; may record the number of exposures made including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. If

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any views called for in the initial request could not be obtained, performer may record reasons. Signs requisition sheet. f. Performer may decide to jacket films, requisition sheets, and related materials and/or have information recorded in log book personally or have this done, depending on institutional procedures. g. May present requisition sheet to radiologist for comments, orders and signature. h. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

TASK DESCRIPTION SHEET

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1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt.reassured,positioned;parts measured;films identified;technical factors selected and set;technique for magnification set up;patient positioned;scouts taken;radiologist assisted with instillation of contrast;exposures made;radiographs sent for processing,taken to radiologist;procedures repeated;delayed films taken after contrast removed; patient returned;examination recorded;sialograms placed for use.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, medical and technical history,prior radiographs, scouts;pen;x-ray control panel,tube,bucky,table,collimator,extension cones;technique,standard view,tube rating,and rad exposure charts;cassettes;occlusal film packets;film holder;shielding;R-L and ID markers;sand bags;head clamp;weighted band;tape;chair; calipers;stool;scissors;view boxes;emergency cart and supplies;sterile gloves,gown;sterile procedure tray;iodized oil contrast;lemon slices;basin;order forms;phone;stretcher or wheelchair

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant conditions; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Patient to have sialography;accompanying adult; radiologist;co-workers

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Taking sialograms of any patient by reviewing request;preparing equipment;preparing and reassuring pt.;measuring part;setting up for magnification technique;taking scout films as ordered;selecting and setting technical factors;identifying films;positioning pt. and equipment;providing shielding;assisting with instillation and evacuation of contrast;collimating;making exposures as and when ordered;arranging for processing;taking to radiologist;continuing,repeating;taking post-evacuation films as ordered;having pt. returned;placing sialograms for use;recording examination.

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Performer receives or obtains the x-ray requisition form,patient identification card, and any appropriate medical-technical history for a patient scheduled for sialography (radiographic contrast study of the salivary glands, ducts and alveoli), as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.
d. From co-worker.

Depending on institutional arrangements, performer may also receive scout film(s) already taken by co-worker with record of technical factors used and/or any changes necessary.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided:

   a. Performer checks the examination called for including the type of contrast medium ordered and the name of the radiologist in charge.
   b. Notes whether a bilateral study is indicated or, if unilateral, which side. Notes which glands are involved (parotid or submandibular). Notes the posi-

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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tions and views called for and any special requests. Notes name of referring clinician. Notes whether magnification is ordered.

c. Performer reads patient's name, identification number, sex, age, and weight. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information on any known pathology that would affect technique. Notes any conditions affecting positioning, suspension of respiration or immobilization such as cardiac or respiratory disease, presence of injuries, whether patient will be on a stretcher or in a wheelchair. Notes whether patient has history of allergies.

d. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter or similar device in place; notes whether patient will be accompanied by nurse or other staff person. Notes shielding needed.

e. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved.
If magnification has been requested, performer checks that the machine to be used has a fractional focal spot of appropriate size for direct magnification technique (i.e., 0.3 mm or smaller).

f. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete.

i) Depending on institutional procedures, performer may review patient's radiation exposure

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history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether there is history of extensive radiography to be brought to radiologist's attention.

ii) Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

iii) Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.

iv) If patient's record indicates orders for sedation or any other prior medication, performer may check timing to be sure a proper elapse of time has occurred for medication to take effect.

g. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer brings this to attention of radiologist in charge. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

h. If referring physician has requested that films already on file be presented with current radiographs and if not already with patient's

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jacketed material, performer arranges to have prior films delivered.

2. Performer prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Washes hands as appropriate.
   b. Checks that procedure tray has been prepared or decides to do personally. Prepares or checks for lemon slices or juice.
   c. Checks that proper accessories are available for procedure including leaded rubber shielding, aprons, and gloves to be used by performer, radiologist, the patient, and/or anyone who will remain in the room during exposure.
   d. Performer checks that appropriate immobilization devices are present, and that there is a mattress, pads, pillows and/or blankets for comfort of patient if patient will lie on table. Makes sure that right (R) and left (L) markers are available for use and identification cards, leaded numerals or markers.

   e. Performer makes sure that an adequate supply of loaded cassettes and/or dental occlusal film packets of the appropriate types and sizes are available in the examination room. If not, arranges to obtain or decides to obtain personally.
   f. Performer reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation for change in machine output or a policy decision).
   g. Performer checks that x-ray equipment is ready for use. Goes to control panel and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for the machine to "warm up." If appropriate, performer may set radiography mode selector and set collimator control for manual operation.
   h. Performer prepares for identification of the films using equipment provided by institution:

      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
      iii) Checks identification against requisition sheet.

3. If magnification has been requested, performer prepares the equipment for the tube-over-table method of magnification (used without bucky):

   a. Performer determines the degree of magnification requested on the requisition sheet; if the request is expressed as an area magnification performer determines the linear magnification by taking the square root. (Linear magnification squared equals area magnification.)
   b. Performer calculates the required distances from target (focal spot) to object (patient) (TOD), and from object to film (OFD), as well as the distance from target to film (TFD) (the sum of TOD and OFD):

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i) If the distance from the table top to a cassette placed on the floor or a stool (OFD) will be a relatively inflexible distance, performer measures this distance or reads indicator scale. (If stool is to be used, may note the table height.) Performer may adjust table height to provide for a round number for the OFD.

ii) If the distance from the focal spot to the table top (TOD) will be the relatively inflexible distance, performer determines what this is by measuring or reading appropriate indicator scale on tube housing. Performer may adjust tube height to provide a round number for the TOD.

iii) Depending on whether the OFD or the TOD is fixed, performer calculates the required complementary distance by referring to a magnification chart for the degree of linear magnification required, or uses the formula: degree of linear magnification equals TFD divided by TOD. For a two-times linear magnification performer simply sets the TOD equal to the OFD.

iv) Performer adjusts and locks the table height and/or the tube height to the calculated OFD and TOD.

c. Performer aligns the object-film and target-object distances:

i) Performer moves the x-ray tube housing until it is centered over the table top in the approximate area where the patient's area of interest will be positioned, such as on table.

ii) Performer swings the table out of the way so that there is no obstruction between the tube and the floor. (Does not change

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height.) If appropriate, places a stool on the floor under the tube. May place cassette of appropriate size on floor or stool. Performer selects the size film designated for the degree of magnification and the selected part to be studied.

iii) Performer adjusts the collimation to correspond to the field size anticipated (for the TOD involved).

iv) Performer activates the light in the collimator and adjusts the tube horizontally so that the light beam cast is centered to the cassette on the stool or floor. Uses the cross-hairs projected by the beam to center the tube to the area on the floor or stool.

v) Performer locks the tube into position so that there is a 90° angle of the beam with the floor or stool. Fixes and retains collimator setting.

vi) Performer marks the outline of the collimated light area or cassette on the floor or stool using tape or other removable marker. If not already done, checks by placing cassette in marked area. May mark center of area as shown by cross-hairs.

vii) Performer swings table back into place. Activates light beam in collimator and marks the table top where the center cross-hairs and light outline are projected (to be used to center the part to be radiographed). Uses tape or other radiolucent removable marker.

viii) Performer may recheck TOD and OFD to be sure that they correspond to the calculated distances.

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d. For magnification technique using a vertical film holder, performer may wait until patient has been brought into examination room. Adjusts upright holder to appropriate height; adjusts x-ray tube to right-angle projection of beam to film holder; centers to the film; measures and adjusts TOD to patient's position and marks patient's position; measures and adjusts OFD from patient's position as marked.

e. If the sum of the new TOD and OFD (TFD) is now different from the TFD used for non-magnification technique, performer may consult technique chart to note the factor to use for a compensatory change in mAs. May record for later use in setting exposure factors.

f. Performer may also note the change in kVp and mAs necessary to compensate for any change in collimation from non-magnification technique. Consults appropriate charts for conversion factors. May record.

4. Performer readies patient for examination by radiologist:

   a. Performer washes hands as appropriate. Depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.

   b. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

   c. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

   d. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

   e. Performer has patient assume a comfortable recumbent or seated position, as appropriate.

      i) If appropriate, places mattress, pillow or clean linen on x-ray table. May place pillows behind patient in wheelchair.

      ii) If patient is in wheelchair, may move patient in chair into position next to table. Makes sure that wheelchair is in locked position if patient is to be positioned in it.

      iii) Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way that may be collided with by patient.

      iv) If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.

      v) If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move or have patient moved to table.

   f. If not already done, has patient remove dentures, hair pins, spectacles, and any jewelry from head

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and neck. Makes sure that all garments are removed down to below the neck. Treats young patient with as much courtesy as adult.

g. Performer explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

   i) May question patient or accompanying adult about any allergies to shellfish or adverse reactions to contrast medium (especially iodine based). Checks whether an allergy test is required. Notifies radiologist if any sensitivity should be brought to his or her attention.
   ii) Performer may explain to patient what side effects may be felt from contrast medium such as feeling of nausea, flushing, choking sensation.
   iii) If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs radiologist and proceeds only with approval.
   iv) Performer answers patient's nonmedical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains, when asked medical questions, that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

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h. Performer measures patient's skull for the dimensions relevant for views ordered:

   i) Uses centimeter calipers to measure the thickness of the skull part(s) to be radiographed in the directions in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors.
   ii) After measuring, has patient rest in as relaxed a position as possible.

5. Performer may note whether a preliminary radiograph (scout film) has already been made of the patient (done by another radiologic technologist if work is organized in this way at institution).

   a. If a scout film has already been made and viewed by radiologist, performer notes the technique used or ordered and plans to set up technical factors for the overhead radiography, adjusting for use of contrast medium.
   b. If a scout film has been made but not approved, performer places processed scout film with patient's chart or places on view box for viewing by radiologist.
   c. If a scout film has not been made, performer awaits orders from radiologist.

6. Performer informs attending radiologist when patient is ready to be examined.

   a. Performer brings requisition sheet, patient's medical history, chart, prior films if ordered, and any

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scout films already processed to radiologist. May display prior films and scouts on view boxes.

b. Performer tells radiologist about any difficulties encountered with regard to information, equipment, possible contraindications or anything else that should be brought to physician's attention. Notes any special orders or change in procedure decided by radiologist.

c. Performer may accompany radiologist to examination room and introduce patient to radiologist.

d. If not already done, performer carries out radiologist's orders for scout films with regard to the side(s) and gland(s) to be studied, positions, use of intraoral occlusal film, use of gonadal and/or other protective shielding.

   i) Performer provides patient, radiologist and everyone who will remain in room during exposure with appropriate protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

   ii) Proceeds with scout films for appropriate area of interest; has scouts processed; places on view boxes and notifies radiologist when scouts can be viewed.

7. During radiologist's review of requisition, scouts, and examination of patient, performer notes radiologist's orders for any changes in technical factors, size and amounts of materials to be used in procedure, special orders for overhead radiographs; discusses timing for procedure. May arrange signals for exposure as soon as contrast is administered. May discuss

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sequence in which gland(s) or side(s) will be examined.

a. If radiologist decides to cancel procedure, performer arranges to terminate and reschedule as appropriate.

b. If decision is to proceed, performer arranges to provide or change any equipment or supplies as ordered by radiologist.

c. Resets technical factors if appropriate for soft tissue technique allowing for use of contrast material and request of radiologist:

   i) Enters control room and checks that controls are set for radiography mode.

   ii) For conventional exposure control, performer selects milliamperage and chooses selectors for the correct focal spot size. Selects and sets the exposure time that will produce the mAs desired. Sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

   iii) For automatic phototimed exposure control, performer selects and sets the category corresponding to the type of study and use or nonuse of screens, bucky, etc., and, if appropriate, focal spot size. Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming). May select and set a kVp range button (if called for with equipment) corresponding to range for examination. Sets a density selector corresponding to the usual (or special) requirements for the study.

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Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.

- iv) Depending on the equipment, may set controls to provide for use of bucky, manual adjustment of table and tube height, position, and of collimation, unless these have already been set.

d. Performer obtains the appropriate size loaded cassette or packet for the first contrast projection. Attaches identification information to the cassette, occlusal film packet or table top:

- i) Places right or left marker on film holder, packet or table-top as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.
- ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of cassette or occlusal film packet.
- iii) If patient identification information is to be entered by use of flasher, sets flash card aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.
- iv) Performer may place patient's card into card tray for equipment using automatic film marking device.

e. If cassette is to be used with bucky (under tabletop or in upright holder) performer may manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position

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or inserts cassette tray into bucky slot and centers.

f. If a bucky is not being used, performer places film holder in a position approximating final positioning.

- i) If magnification technique is to be used, performer places cassette in marked position on floor or stool.
- ii) If appropriate to make possible minimal movement of patient, performer may place cassette in upright holder at right angles to table top or in other position selected.

g. Performer checks that patient, radiologist and everyone remaining in room is provided with protective shielding.

8. Performer prepares patient and equipment for instillation of contrast so that the overhead films can be made immediately after the contrast is instilled (one gland at a time). Performer prepares the part to be radiographed in the position selected for the first (or next) exposure (unless this is done by physician):

a. May explain or demonstrate to patient what is required. May obtain help in positioning or assists MD to position.

b. Performer positions patient by first positioning body and then positioning head. In positioning body, performer proceeds as follows:

- i) For positioning patient in AP or PA (supine or seated erect) position, performer arranges body so that its median sagittal plane is centered to the midline of table or film holder.

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ii) For lateral positioning has median sagittal plane parallel with midline. Supports any elevated parts. Has seated patients distribute weight evenly on both buttocks.

iii) Has semiprone patient rest on forearm and flexed knee of elevated side, and supports ankles and flexed knee.

iv) Has seated erect patient face film holder for PA projection and face away from film holder for AP projection.

v) Has supine patient place arms in a comfortable position and supports ankles and knees.

vi) For oblique erect position adjusts body to make possible correct angulation of the head. Places arms in comfortable position.

viii) With all positions arranges shoulders to lie on a single transverse plane.

c. In positioning head, performer refers to standard reference lines. Has patient first relax muscles of neck and then moves head gently.

i) Performer defines the median sagittal plane of the skull by referring to the sagittal line connecting nasion, acanthion and symphysis menti (mental point).

ii) Performer defines the infraorbitomeatal line by finding the line connecting the external auditory meatus and the infraorbital margin. May palpate to find infraorbital margin.

iii) Performer defines the acanthiomeatal line as that connecting the external auditory meatus and the acanthion.

d. Performer centers part and keeps the long axis of the part parallel

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to the film holder. When using a bucky, centers patient to midline. With cassette on table top, centers film to part. With upright holder, adjusts height of holder to part and centers part to film.

e. Performer sets the focal-film distance (if not already done, as with magnification technique). Operates controls or manually moves the x-ray tube into place over the film holder (or at right angles to upright holder). Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required TFD (FFD) is obtained.

f. For intraoral studies, performer prepares dental occlusal film packets. Does not insert in patient's mouth until head has been positioned and immobilized, patient has been shielded, central ray has been adjusted in approximate position and contrast has been administered. If occlusal film is to be used, chooses seated position if headrest is available on chair and if erect position is not contraindicated. May discuss with radiologist.

9. Performer positions as follows (unless nonconventional positioning is being used to avoid having patient move or patient is positioned by radiologist):

a. For studies of the parotid gland(s), performer notes the side of interest and the position required (AP or PA, recumbent or seated) and whether an intraoral view is required.

i) For a tangential projection of the parotid gland using AP position, performer has the pa-

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tient assume a seated or supine position facing the central ray source. Rotates patient's head toward the side of interest so that the parotid area of the side of interest is at right angles to the plane of the film. Has patient rest head on the occiput so that the mandibular ramus is parallel with the longitudinal axis of the film. Has patient tuck in chin. Centers film to the area of interest. Directs central ray at right angles to plane of film along the outer surface of the mandibular ramus.

For a tangential projection of the parotid gland using PA position, performer has patient assume a seated position facing the film holder. Rotates patient's head as in (i), above, and has patient rest head on forehead and nose. Continues as in (i), above.

Performer may rehearse patient in filling mouth with air and holding breath to provide better contrast.

ii) For an intraoral anterior projection of the parotid gland, performer may rehearse patient in film packet placement. Has patient relax mouth; performer places dental occlusal film vertically in the oral vestibule in front of the upper molars. Directs the central ray to midpoint of film at about 5° caudad.

iii) For a lateral projection of the parotid gland, performer has patient assume semiprone or seated erect lateral position. For seated patient has shoulder of side being examined against film holder. Extends patient's head to clear space between cervical spine and mandibular rami. Adjusts head so that median saggital plane is rotated forward about 15° from the lateral position. Centers film on side of interest to a point about one inch above the angle of the jaw. Directs central ray at right angles to midpoint of film.

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iv) For an oblique lateral projection (axiolateral view) of the parotid gland, may adjust head of seated patient on an angle block placed at a 15° cranial angle. Extends cheek of affected side over angle block and depresses shoulder of elevated side. Places film holder under cheek and centers to a point .5 inch anterior to and one inch inferior to the external auditory meatus. Adjusts head so that broad surface of ramus is parallel with plane of film and acanthiomeatal line is parallel with transverse axis of film. Tapes film holder to angle block. Directs central ray 30°cephalad and 10° posteriorly, directed to midpoint of film. Performer may adjust head of semisupine patient on an angle block directed cranially, with affected cheek in lateral position on film holder, and affected side of body next to table. Adjusts elevation of holder adjacent to shoulder so that film is in close contact with jaw. Rotates head so that broad surface of ramus is parallel to plane of film, and extends chin so that the acanthiomeatal line is parallel with the transverse axis of the film. Directs central ray

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to the midpoint of the film at 25° cephalad.

b. For studies of the submandibular (submaxillary) gland(s), performer notes the side of interest, the views required, and the order in which they are to be done.

   i) For a lateral projection of the submandibular gland, performer positions patient in semiprone or seated erect, lateral position with side of interest against film holder,and extends patient's head. Adjusts head in true lateral position. Centers film to the inferior margin of the angle of the mandible. Directs central ray at right angles to midpoint of film. May rehearse patient in depressing floor of mouth during exposure by having patient place an index finger on the back of tongue on affected side.

   ii) For oblique lateral projection (axiolateral view) of the submandibular gland(s), performer positions patient as in (a, iv), above, but centers to the angle of the mandible.

   iii) For a verticosubmental projection (axial view) of the submandibular gland area posterior or lateral to the floor of the oral cavity, performer has patient assume a seated position with head resting on chin, extended across a film holder lying horizontally and supported. Centers median sagittal plane of head to midline of film at a level just below the external auditory meatuses. Supports film holder so that it is in direct contact with throat and, if angulation is needed, at a cranial angle. Adjusts head so that median sagittal plane is vertical. If film is horizontal, directs central ray to midpoint of film at right angles to the infraorbitomeatal line. If film is angled cranially, directs central ray to midpoint of film at right angles to the occlusal plane.

c. For intraoral projection of the duct, anteromedial part of submandibular gland areas or sublingual gland area (submentovertical projection),performer has patient assume seated position with head in headrest so that the occlusal plane is vertical. If no headrest is available has patient assume supine position with thorax supported and head extended, resting on vertex, with median sagittal plane vertical. Performer rehearses patient in placement of film, and just before exposure places film in final position. Performer has patient open mouth. Inserts film packet with pebbled surface facing caudally and with long axis directed transversely. Centers film to the median sagittal plane and gently inserts far back so that it is in contact with the anterior borders of the mandibular rami.
May have patient assist by depressing and retracting own tongue or by phonating "ah" and breathing deeply through the mouth. Has patient close mouth to hold film. Rechecks position. With film packet in position, performer directs the central ray at right angles to the plane of the film, centered to the intersection of the median sagittal plane and a coronal plane passing through the second molars.

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d. Performer immobilizes skull with a head clamp or a weighted band and/or uses sandbags to support. Rechecks angulation and positioning.

e. Performer checks positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size. Uses cross-hair shadows as reference for center of field and collimator light to center the tube to the part. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired. May readjust tube position lengthwise or crosswise to provide better centering.

f. Once the patient has been positioned and immobilized, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). May use extension cone (in direct contact with head when appropriate for immobilization) for proper collimation. Adjusts primary beam to minimum size needed to cover the part(s) of interest. Removes film packets from patient's mouth until ready for exposure.

10. Performer checks that everything is ready for administration of the contrast medium:

a. Rechecks that all equipment is ready for use.

b. Performer indicates to radiologist when the patient and equipment are ready for instillation of the contrast medium. Makes any adjustments as ordered.

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c. Performer washes hands for procedure observing sterile technique as appropriate.

d. If appropriate, performer opens packet of sterile gloves for radiologist, observing sterile technique so that wrapper, own hands, or other objects will not contaminate gloves.

e. May assist in sterile surgical techniques as appropriate by handing materials asked for.

f. If so ordered, performer may use lemon juice or slices and place a few drops of lemon juice in patient's mouth to cause salivation.

g. When ordered, performer holds syringe end while radiologist removes dilator and inserts a cannula into ductal opening of gland.

11. On orders from the radiologist, performer makes the sialograms for the gland that was opacified in the position(s) ordered, and as quickly as possible:

a. Performer rechecks positioning of patient, film, and central ray.

b. If intraoral films are to be used, performer inserts film packet as described above. Has patient close mouth to hold film. Rechecks and readjusts position of head and x-ray tube as described above.

c. Performer sets the focal-film distance, if not already done, as appropriate.

d. Rechecks that patient has been properly shielded.

e. When everything is ready for the exposure, performer reminds patient of the breath control to be used for exposure:

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- i) May have patient depress tongue.
- ii) May have patient fill mouth with air when ordered and hold breath until told to relax.
- iii) May have patient hold breath when ordered until told to relax.

f. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

12. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to breathe as instructed by calling or using intercom. Performer initiates exposure by pressing hand trigger or exposure control button.

a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.

b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction, may decide to report; anticipates need to repeat exposure.

c. With phototimer, notes whether back-up timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure (due to underexposure if premature cut-off, or overexposure due to faulty timer).

d. After exposure is completed tells patient that he or she can relax.

e. If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

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f. After exposure performer returns to patient. Removes cassette, packet or film holder from table, floor, bucky or patient's mouth. Removes any markers for further use.

g. Performer repeats radiography steps for all exposures ordered by radiologist, adjusting technical factors, tube, and position of table or film holder as appropriate to each view ordered for opacified gland.

h. Performer arranges to have the first exposure(s) processed at once or decides to do personally. Attaches ID card for use with flasher if appropriate. May sign requisition.

i. While films are being processed, makes sure that patient is comfortable and, if necessary, attended by radiologist, staff person or self.

13. Throughout radiography procedure performer remains alert for any symptom of adverse reaction, especially reaction to contrast such as severe flushing, salivation, choking, vomiting, pallor, fainting, or shock. As soon as performer judges that reaction may be severe, ceases exposure and notifies radiologist or attending physician at once.

14. Performer brings the first processed radiographs directly to the radiologist in charge or places on view boxes and informs radiologist that they are ready. May also hang prior films and scouts.

a. Performer notes instructions from radiologist regarding need to repeat instillation of contrast, to repeat radiography with change in patient, tube or film

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positioning, or with change in technical factors. Notes instructions with regard to instillation of opposite side or another duct.

b. Performer repeats appropriate steps depending on radiologist's orders. For further exposures performer repeats appropriate steps for next view(s) including identification of film, use of R-L marker, selection and setting of technique, positioning patient and equipment, collimation, shielding, breathing instructions, making exposure, and processing, as described above.
c. Performer refrains from commenting on the films or providing any interpretation.
d. If performer is asked to repeat any exposures, performer notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."
e. If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member.
f. If request for retakes reflects the preference for density or contrast of the radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.
g. Performer shows subsequent sets of radiographs to radiologist as processed and proceeds as described above until radiologist indicates that examination is completed.

15. When the radiologist indicates that the radiography is completed, performer carries out termination steps:

a. Performer may give patient lemon slices to suck on to induce salivation as a means of evacuating

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the contrast medium from the glands and ducts. Reassures patient; has patient spit contrast out into basin.
b. Notes any orders for post-evacuation films to be taken after an elapse of several minutes. If so,

   i) May arrange to have patient taken to appropriate holding area after evacuation of contrast medium.
   ii) Keeps track of time elapse and takes delayed films as appropriate (following steps for radiography as described above) when indicated.
   iii) May have radiologist fill out requisition if delayed films or additional radiography is required.

c. After all radiography is completed, may decide to assist patient to chair or stretcher or from table. Makes sure patient is reminded of any footrest in stepping off table. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient.
d. Performer may have patient transported back to holding area or next location, or decides to do personally, as appropriate. If appropriate, makes sure that patient is in the care of a staff person who will transport to appropriate next location.
e. Performer may have room and equipment cleaned; has any other appropriate clean-up procedures followed to avoid infection or contamination, or decides to do personally, depending on institutional arrangements.
f. Performer records the examination according to institutional proce-

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dures. May include date, room, examination type, the overhead views taken, the technical factors used, and film sizes. Performer may record the number of exposures made of each overhead view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. Signs requisition sheet. g. May present requisition sheet to radiologist for comments, orders and signature. h. Performer may decide to jacket radiographs, requisition sheets, and related materials and/or have information recorded in log book personally or have this done, depending on institutional procedures. i. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

TASK DESCRIPTION SHEET

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1. **What is the output of this task?** (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured,positioned,measured;films identified;technical factors selected and set;equipment and procedure tray prepared;radiologist assisted with overhead of needle placement and injection of contrast;pt. positioned;contrast scout taken or lymphangiograms or lymphadenograms made;radiographs sent for processing,taken to radiologist;procedures repeated;patient returned;examination recorded;radiographs placed for use.

2. **What is used in performing this task?** (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, medical-technical history,prior radiographs,scouts, pen;x-ray control panel,tube,bucky,table,collimator, extension cones;technique,standard view,tube rating, and rad exposure charts;cassettes;film holder;shielding;R-L and ID markers;immobilization devices;calipers;stool;view boxes;emergency cart and supplies; sterile gloves,gown;sterile procedure tray;iodized oil contrast;injector-heater;phone;order forms; stretcher or wheelchair

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Any patient to have lymphography;accompanying adult; radiologist;nursing staff;co-worker

5. **Name the task** so that the answers to questions 1-4 are reflected. Underline essential words.

Taking lymphangiograms or lymphadenograms of any patient,by reviewing request;reassuring pt.;measuring part(s);preparing equipment;arranging for radiography of needle placement;assisting with administration of contrast;selecting and setting technical factors;identifying film(s);positioning pt. and equipment;providing shielding;collimating;making exposures of iliac nodes,lymph vessels or nodes as and/ or when ordered;arranging for processing;taking to radiologist;continuing,as ordered;arranging for delayed films of lymph nodes if ordered;having pt. returned;placing radiographs for use;recording examination.

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Performer receives or obtains the x-ray requisition form, patient identification card, and any appropriate medical-technical history for a patient scheduled for lymphography (lymphangiography, radiography of the lymphatic vessels, and/or lymphadenography, radiography of the lymph nodes, after injection of a contrast medium) as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.
d. At request of radiologist.

Request may be for initial examination covering a scout film and lymphangiograms after injection of contrast, or delayed lymphadenograms made at least a day after injection of contrast. If not initial examination, performer may also receive prior scouts,lymphangiograms and/or record of exposure technique(s) used.

1. Performer reads the requisition sheet to determine the examination called for, the area of interest, the patient involved, special considerations, and to check the completeness of the information provided:
   a. Performer checks the examination called for, the name of the radiologist in charge and the area(s)

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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of involvement (such as lower extremities, groin area, iliopelvic-abdominoaortic region, thoracic duct, axilla, and/or upper extremities). Notes whether, for extremities, bilateral or unilateral study is ordered; if the latter, notes the side of interest.

b. Notes whether order covers initial examination or delayed films. If the latter, notes record of techniques used and projections requested.

c. Performer reads patient's name, identification number, sex, age, height and weight. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information on any known pathology that would affect technique. Notes any conditions affecting positioning, suspension of respiration or immobilization such as cardiac or respiratory disease, presence of injuries, whether patient will be on a stretcher or in a wheelchair. If initial examination, notes whether patient has history of allergies.

d. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter or similar device in place; notes whether patient will be accompanied by nurse or other staff person. Notes shielding needed.

e. If performer is not already assigned to examination room (and a particular machine) notes the room or machine involved.

f. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete.

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i) Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether there is history of extensive radiography to be reported to radiologist.

ii) Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

iii) Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.

iv) If patient's record indicates orders for sedation or any other prior medication, performer may check timing to be sure a proper elapse of time has occurred for medication to take effect.

g. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer brings this to attention of radiologist in charge. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

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h. If referring physician has requested that films already on file be presented with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. If the surgical procedure for injection of the contrast medium is to be done in the radiology department, performer may check that patient is present, is ready to be seen by radiologist,and/or is ready for the surgical technique. May check with nurse or may be assigned to do personally. Makes sure that procedure tray and emergency cart is ready in appropriate location or decides to prepare personally.

   a. Performer may inform attending radiologist when patient is ready to be examined. Brings requisition sheet, patient's medical history, chart, and any prior films, to radiologist. May display prior films on view boxes.
   b. Performer tells radiologist about any difficulties encountered with regard to information, possible contraindications or anything else that should be brought to physician's attention.
   c. During radiologist's review of requisition, prior films and examination of patient, performer notes radiologist's orders for positioning, technical factors, size of cassettes or materials to be used in procedure. Discusses timing for radiography. May discuss sequence in which areas of interest will be radiographed.
   d. If radiologist decides to cancel procedure, performer arranges to terminate and reschedule as appropriate.

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3. Depending on the point at which performer sees the patient (before or after injection of contrast medium), performer may see patient and prepare for radiography. May do any or all of the following:

   a. Performer washes hands as appropriate. Depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
   b. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.
   c. If contrast has not yet been instilled, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.
   d. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier.

      If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

   e. Performer may explain to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

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- i) If not already done, may question patient or accompanying adult about any allergies to shellfish or adverse reactions to contrast medium (especially iodine based). Checks whether an allergy test is required. Notifies radiologist if any sensitivity should be brought to his or her attention.
- ii) Performer may explain to patient what side effects may be felt from contrast medium such as feeling of nausea, flushing, choking sensation.
- iii) If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs radiologist and proceeds only with approval.
- iv) Performer answers patient's nonmedical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains, when asked medical questions, that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

f. Performer has patient assume a comfortable supine position (or remain in supine position if contrast has already been instilled).

- i) If appropriate, places mattress, pillow or clean linen on examination table.
- ii) If contrast has not been instilled and patient is in wheelchair, may move patient in chair into position next to table. Makes sure that wheelchair is in locked position.
- iii) May decide to assist patient to table or has this done; may obtain help. Makes sure that no equipment is in the way that may be collided with by patient. If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.
- iv) If patient is on radiolucent stretcher, places stretcher into position so that stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move or have patient moved to table.
- v) Makes sure that there is no clothing or jewelry on area(s) of interest. Permits patient to keep covered with gown until measurements are taken and until exposure. Treats young patient with as much courtesy as adult.

g. If patient has an IV drip in place, performer checks that needle has not become dislodged and that the fluid is dripping at an even rate. If there are any problems, performer clamps tube and notifies an appropriate staff person at once.

h. Performer questions patient and/or RN or MD present on what movement is possible to determine if the positions ordered are available for use. Notes whether injuries present require positioning by MD.

i. Performer notes the patient's body type, whether the area of

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interest is heavily covered by muscle or soft fat, whether the palpation points will be easy to find. Notes whether the lower extremities are of unequal length.

j. Depending on the areas of interest to be radiographed, performer uses centimeter calipers to measure the thickness of the part(s) in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors.

   i) In locating iliac crest, performer is careful not to center too high by making sure not to confuse the iliac crest with the heavy muscles immediately above the crest. May have patient inhale deeply and breathe out; then palpates the point of the crest while the muscles are relaxed.
   ii) If performer believes that patient will be embarrassed by palpation of the symphysis pubis, uses the most prominent point of the greater trochanter to locate the same transverse plane.
   iii) If moving patient with a urinary catheter in place, performer turns patient toward the catheter and tubing to prevent separating it from drainage bottle and breaking sterile system and to avoid causing pain.
   iv) After measuring, has patient rest in as relaxed a position as possible.
   v) If patient has not yet seen radiologist, performer may inform radiologist or co-worker that patient is ready to be examined or prepared.

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4. Once radiologist indicates that instillation is to proceed, arranges to provide or change any equipment or supplies as ordered by radiologist.

5. If performer is to assist with injection of contrast medium, washes hands, observing sterile technique as appropriate.

   a. If appropriate, performer opens packet of sterile gloves for radiologist, observing sterile technique so that wrapper, own hands, or other objects will not contaminate gloves.
   b. May assist in sterile surgical techniques as appropriate by handing materials asked for.
   c. May have syringes prepared with contrast medium (iodized oil) or decides to do personally. May place in injector-heater machine. May check periodically to see that temperature of injector-heater is maintained, as ordered.

6. If the surgical procedure for injection of the contrast medium is done in the radiology department, performer may take radiograph(s) of injection site(s) (in lymphatics of the feet or hands, depending on area of interest) for check of needle placement(s). May have these radiographs taken with bedside mobile equipment or decides to radiograph personally.

   a. If overhead check of needle placement is ordered, arranges for radiographs as indicated by the radiologist. Positions as for plain films of the hands or feet with patient in the supine position on examination table.
   b. Has radiograph(s) processed immediately and places on view boxes for radiologist.

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c. Continues as ordered until radiologist is satisfied with needle placement (in two sites if both hands or both feet are injected).
d. Notes timing for overhead filming and lymphangiography after injection.

7. If requisition is for initial examination, performer prepares for scout filming of iliac nodes and vessels to check progress of contrast medium after injection. Plans for lymphangiography after proper elapse of time after injection (one half to one and a half hours after injection, with priority given to any study of thoracic duct). If requisition is for delayed filming (at least 24 hours after injection), performer reviews technique used for lymphangiograms (done by self or co-worker) and proceeds as for prior films.

a. Checks that proper accessories are available for radiography including leaded rubber shielding, lead aprons to be used by anyone who will remain in the room during exposure. Checks that appropriate immobilization devices are present. Makes sure that right (R) and left (L) markers are available for use and identification cards or leaded numerals or markers.
b. Performer prepares for identification of the films using equipment provided by institution:

i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
iii) Checks identification against requisition sheet.

c. Makes sure that an adequate supply of loaded cassettes of the appropriate types and sizes are available in the examination room. If not, arranges to obtain or decides to obtain personally.

i) Depending on whether a bucky or table top technique will be used and standard institutional practices, performer selects speed and type of film, grid, and cassette combination.
ii) Selects size(s) based on the area(s) to be included, the patient's size, and whether two exposures (and cassettes) will be needed to present a given view.

d. Performer reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation to a change in machine output or a policy decision).
e. Performer checks that x-ray equipment is ready for use. Goes to control panel and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for the machine to "warm up." If appropriate, performer may set radiography mode selector and set collimator control for manual opera-

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tion. Makes sure that all circuits have been stabilized.

f. Unless already done, performer selects technical factors for scout film of pelvic area, first,or next lymphangiogram, or first or next lymphadenogram:

   i) Consults technique chart(s) posted for machine. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other accessories (such as screens, grids, bucky, etc.).
   ii) Makes note of the kVp, mA, T(seconds of exposure time), focal spot size, and the focal film distance (TFD or FFD) called for.
   iii) Once the standard kVp, mA and time have been determined, performer notes whether any conversions are necessary to account for a pathological condition, a change in TFD, the preference of the radiologist involved, and any other conversion needed such as with obese patients or posted changes. Performer looks up numerical conversion factors and calculates or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate.
   iv) Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

g. Performer sets exposure factors as selected:

   i) If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.
   ii) For conventional exposure control: Performer sets milliamperage by choosing selectors for the correct focal spot size; sets the mA selected. Selects and sets the exposure time that will produce the mAs desired. Sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.
   iii) For automatic phototimed exposure control: Performer selects and sets the category corresponding to the type of study and use or non-use of screens, bucky, etc., and, if appropriate, focal spot size. Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).
   May select and set a kVp range button, if called for with equipment, corresponding to kV range for the examination. Sets a density selector corresponding to the usual (or special) requirements for the study. Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.

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iv) Depending on the equipment, may set controls to provide for use of bucky, manual tableside adjustments of table and tube height, position, and of collimation.

8. Performer returns to examination room and prepares for the exposure:

   a. Performer obtains the appropriate size loaded cassette for the first (or next) projection. Attaches identification information to the cassette or table top:

      i) Places right or left marker on film holder or table-top as appropriate to the projection, or depresses appropriate R or L button for automatic marking.
      ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of cassette.

      iii) If patient identification information is to be entered by use of flasher, sets flash card aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.
      iv) Performer may place patient's card into card tray for equipment using automatic film marking device.

   b. If cassette is to be used with bucky (under tabletop) performer may manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.

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   c. If a bucky is not being used, performer places film holder in a position approximating final positioning. If appropriate to make possible minimal movement of patient, performer may place cassette in upright holder at right angles to table top.
   d. Performer sets the focal-film distance (if not already done). Operates controls or manually moves the x-ray tube into place over the film holder (or at right angles to upright holder). Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.

9. Performer prepares the part to be radiographed in the supine position selected for the first (or next) exposure (unless this is done by physician):

   a. May explain or demonstrate to patient what is required. May obtain help in positioning or assists MD to position.
   b. Performer positions patient in AP, lateral or oblique AP recumbent positions or as called for, following procedures as for "plain" films of the area of interest.

      i) Has patient place arms in a comfortable position; supports ankles and knees. For thin patient performer may elevate chest so that the cervical vertebrae are at a correct level. Arranges shoulders to lie on a single transverse plane.

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ii) For positioning patient in AP supine position, performer arranges body so that its median sagittal plane is centered to the midline of table or film holder.

iii) For lateral or oblique positioning has median sagittal plane parallel with midline. Supports any elevated parts.

c. Performer centers part and keeps the long axis of the part parallel to the film holder. When using a bucky, centers patient to midline. With cassette on table top, centers film to part. With vertical holder, adjusts height of holder to part and centers.

d. When positioning a patient with a balloon catheter in place, performer makes sure that the clamp is not lying over a part to be exposed or that patient is not lying on the clamp.

e. If patient has a wound, colostomy, ileostomy, or T-tube with dressing to be removed, performer checks whether zinc or iodoform paste or radiopaque gauze is being used. If so, has appropriate staff member remove dressing or tube or decides to do personally (if appropriate). Checks that radiopaque paste or gauze is completely removed.

10. Performer places the part to be radiographed in the final position selected for the first or next exposure as follows:

a. For projections of the iliopelvic-abdominoaortic region (scout film to check progress of the contrast medium to the common iliac nodes, or regular radiographs to demonstrate possible pathology in the

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area), performer checks to be sure what areas are to be included in the radiograph and notes whether gonadal protection can be provided without interfering with diagnostic purpose of study.

i) For AP projection (posterior view) of iliopelvic-abdominoaortic region, performer has patient lie in supine AP position. Centers body to midline; supports knees and immobilizes ankles. Places the cassette low enough to include the lower border of the ischium. Centers to the level of the iliac crests; may palpate for the crest. Has patient flex elbows and place hands on upper chest. May have patient flex hips and knees to place back in contact with table, and supports. Directs central ray at right angles to center of film at the level of the iliac crests.

ii) For right and left oblique AP projections, performer has supine patient rotate body 30° in the direction of the side of interest. Asks patient to place arm on the side next to table comfortably. Has patient cross and flex upper hip and knee. Has patient grasp side of table with opposite hand. Supports elevated shoulder, hip and knee. Checks and adjusts body rotation. Centers cassette at the level of the iliac crests and includes the lower border of the ischium. Directs central ray at right angles to midpoint of film. After exposure, repeats in reverse position for other side.

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b. For projections of the thoracic duct, performer checks proper timing for lymphangiograms (if ordered after instillation of contrast) so as to make projections while contrast remains in the duct. For lateral view notes whether lateral recumbent vertical filming or supine horizontal filming will be involved.

   i) For AP projection (posterior view) of thoracic duct, performer has supine patient assume true AP position with long axis of x-ray tube parallel to the midline, with the anode at the head end of the patient (to provide a view facing caudally) and the cathode on the side of the feet (to take advantage of "heel effect"). Centers film so that upper margin is about two inches above the supraclavicular area (upper border of shoulders). Places arms alongside body and adjusts shoulders to lie in a single transverse plane. May have hips and knees flexed to put the back in contact with table. Immobilizes feet. Directs central ray at right angles to midpoint of film.

   ii) For left lateral projection of thoracic duct, has patient move into a lateral recumbent position with the left side closer to the film. May have patient remain in AP position and use upright holder for cross-table filming. Centers the midaxillary line of the body to the midline of the plane of the film, and places upper margin of film about two inches above the upper border of the shoulders. Supports patient's head so that its median sagittal plane is in line with long axis of vertebral column. May support lower thoracic region.

   For lateral recumbent position, has patient flex hips and knees. Elevates and supports lower knee to hip level; places sandbag on top and then superimposes upper knee. Supports ankles similarly. Adjusts upper arms forward at right angles to long axis of body and has lower hand rest under head. Has patient hold table edge with upper hand. Adjusts so that scapulae are in a single plane. Adjusts body in true lateral position.

   Directs central ray at right angles to midpoint of film.

c. For AP projections (posterior view) of lower extremity, performer notes whether the area of interest will include the lower leg, upper leg and/or groin. Plans for three radiographs if all three areas are to be included. Positions for bilateral view so that both legs will be projected with one exposure.

   If the patient's extremities are of unequal length, performer notes whether the legs or the femora are unequal. Makes adjustment in positioning at the joint above the unequal part, such as placing pelvis so that greater trochanters are in the same transverse plane for unequal femora, and knees at same transverse plane for unequal legs. In immobilizing is careful to position and support feet to avoid rotation of the upper ends of the femora.

   i) For AP projection of the lower legs (tibias and fibulas), posi-

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tions to include the ankle joints. Has supine patient lie in AP position and adjusts body so that there is no rotation at the pelvis. Extends the legs and slightly inverts the feet without rotating legs. Supports knees. Supports soles with sandbags. Keeps plantar surface at right angles to film holder. Centers cassette to midpoint between legs at the level of the midpoint of the tibias. Directs central ray at right angles to center of film.

ii) For AP projection of the femora, performer positions to include the knee joints. Has supine patient lie in AP position with legs fully extended and feet somewhat inverted, with pelvis unrotated. Supports ankles. Centers cassette to midpoint between femora at the level of the midfemora. Directs central ray at right angles to center of film.

iii) For AP projection of the groin areas (pelvis and upper femora), performer has supine patient extend both legs. Supports knees. Places sandbags under ankle joints and adjusts to same transverse plane. For extremities of unequal length adjusts as described above. Inverts feet so that long axes of femora are parallel with plane of film by grasping heels and turning feet medially. Performer may check that there is no rotation of pelvis by measuring the distance from the anterior superior iliac spine to tabletop on each side. Overcomes rotation of pelvis due to swelling or atrophy by elevating appropriate side. Immobilizes. Centers cassette to the level of the symphysis pubis. Directs the central ray at right angles to the midpoint of the film.

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d. For projections of the upper extremity (arm and forearm), the performer checks the side of interest. May place the cassette diagonally on the table so that the entire extremity can be included in the projection.

i) For an AP projection (posterior view) of arm and forearm, performer has the patient lie in supine position with the elbow extended and hand supinated. Elevates the opposite shoulder so that entire extremity is in contact with surface of cassette. May place sandbag on upturned palm. Centers film (on diagonal) to the elbow. Directs central ray at right angles to the midpoint, entering at the elbow joint. If a bilateral study has been ordered, sets up similarly for opposite side.

ii) For a lateral projection of arm and forearm, has patient lie on table as above. Has patient abduct arm and flex elbow about 90°, rotating forearm internally (medially), with epicondyles at right angles to the plane of the film. Checks that arm and forearm are in the same plane and parallel with table top. Makes sure wrist is in lateral, thumb up position. Makes sure that the radius, ulna and carpal bones are in lateral superimposition. Uses sandbags to support hand. Centers film to elbow and includes areas of

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interest. Directs central ray at right angles to the elbow joint. If a bilateral study has been ordered, sets up similarly for opposite side.

e. For projections of the axilla, performer checks side of interest and whether bilateral study is ordered

i) For AP projection (posterior view) of axilla, performer has supine patient lie in AP position. Centers to the coracoid process, and places upper part of cassette about two inches above the supraclavicular region. Supports shoulder and hip on opposite side.

Notes whether external, neutral and/or internal rotation is requested. Performer locates the epicondyles and holds between thumb and index finger of one hand while adjusting the arm. With external rotation has patient turn palm forward. Abducts arm slightly so that the coronal plane of the epicondyles is parallel with plane of film. Supports as needed. With neutral rotation has patient rest palm of hand against thigh. Wtih internal rotation has patient flex elbow somewhat, rotate arm internally, and rest back of hand on hip. Adjusts arm so that the coronal plane of the epicondyles is perpendicular to the plane of the film. Directs central ray at right angles to midpoint at the level of the coracoid process. If a bilateral study has been ordered, sets up similarly for opposite side.

ii) For right and left oblique AP projections, has supine patient rotate body 45° in the direction of the side of interest. Centers film to the region of the coracoid process, including the supraclavicular region. Supports the elevated shoulder and hip. Performer adjusts the degree of rotation so that the scapula is parallel with the plane of the film and the humerus rests against film. For internal rotation abducts the arm slightly and places the hand against the side of body. Directs the central ray at right angles to the midpoint of the film. After exposure, repeats in reverse position, rotating body 45° in the opposite direction away from the side of interest. If a bilateral study has been ordered, sets up similarly for R and L oblique views of axilla joint on opposite side.

f. Throughout procedure performer remains alert for any symptom of adverse reaction, especially reaction to contrast, such as severe flushing, salivation, choking, vomiting, pallor, fainting, or shock. As soon as performer judges that reaction or pain may be severe, notifies radiologist or attending physician at once.

11. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to film size. Uses cross-hair shadows as reference for center of field. Checks that primary beam will enter the center of the

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area of interest at the selected angle to the film so as to project the view desired. May readjust tube position lengthwise or crosswise to provide better centering.

12. Once the patient has been positioned and immobilized, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). For small fields performer may attach auxiliary extension cone to collimator to further reduce the primary beam.

13. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest, especially gonads. Provides patient and everyone who will remain in room during exposure with appropriate protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

14. When everything is ready for the exposure, performer explains to patient what breath control will be used for exposure as appropriate, such as holding still, breathing out and holding, or breathing quietly when told to do so by performer and until told to relax. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

15. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to take a deep breath and exhale, and/or hold still

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or breathe quietly, by calling or using intercom. Performer initiates exposure by pressing hand trigger or exposure control button.

   a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
   b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.
   c. With phototimer notes whether backup timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure (due to underexposure if premature cut-off, or overexposure due to faulty timer).
   d. After exposure is completed tells patient that he or she can relax.
   e. If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

16. Performer returns to patient. Removes cassette or film holder from table or bucky.

   a. Removes any markers for further use. Repeats steps for positioning, identification, collimation, shielding and selection of technical factors as appropriate for any other projections ordered for the area of interest and repeats exposures.
   b. If the exposure(s) are scouts, lymphangiograms, or if so requested, performer arranges to have

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the exposure(s) processed at once or decides to do personally. Has lymphadenograms processed as appropriate. Attaches ID card for use with flasher if appropriate. May sign requisition.

c. While films are being processed, makes sure that patient is comfortable and, if necessary, attended by staff person or self.

17. Performer brings the first processed scouts or lymphangiograms directly to the radiologist in charge or places on view boxes and informs radiologist that they are ready. May also hang prior films and scouts.

   a. Performer notes instructions from radiologist regarding any need to continue instillation of contrast, to repeat radiography with change in patient, tube, or film positioning, or with change in technical factors.
   b. Notes instructions with regard to lymphangiography or delayed films:

      i) If processed film is a scout, performer makes note of appropriate timing for lymphangiograms and any special orders from radiologist. May discuss.
      ii) If processed films are lymphangiograms, performer carries out or repeats orders until radiologist indicates that lymphangiography is complete.

   c. Performer refrains from commenting on the films or providing any interpretation to patient.
   d. If performer is asked to repeat any exposures, performer notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."

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      i) If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member.
      ii) If request for retakes reflects the preference for density or contrast of the radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.

18. When lymphadenography is completed or when the radiologist indicates that lymphangiography is completed, performer carries out termination steps:

   a. Notes any orders for delayed films to be taken after an elapse of 24 hours or more (lymphadenograms). May have radiologist fill out requisition.
   b. If performer is completing lymphangiography, may return to patient to explain need to return for lymphadenograms. May explain to patient that the intradermal injection of dye may cause patient's skin and urine to be tinted blue for one or two days. With in-patient may arrange to have nursing staff in charge of patient's care informed.
   c. After radiography is completed, performer may decide to assist patient from table or to chair or stretcher. Makes sure patient is reminded of any footrest in stepping off table. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient.

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d. Performer may have patient transported back to recovery or holding area, next location or room, or decides to do personally, as appropriate. If appropriate, makes sure that patient is in the care of a staff person who will transport to appropriate next location or who will have out-patient discharged. e. Performer may have room and equipment cleaned; has any other appropriate clean-up procedures followed to avoid infection or contamination, or decides to do personally, depending on institutional arrangements. f. May present requisition sheet to radiologist for comments, orders and signature. g. If performer will only carry out preliminary "scout" filming and/or lymphangiography, performer records the approved technical factors used for the radiographs, and the accessories employed, or informs technologist who will continue. Performer gives the requisition sheet, name card, and any notes to technologist who will continue with procedure or places for further use as appropriate. h. Performer records the examination according to institutional procedures. May include date, room, examination type, the overhead views taken, the technical factors used, and film sizes. Performer may record the number of exposures made of each overhead view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. Signs requisition sheet. i. Performer may decide to personally jacket radiographs, requisition sheets, and related materials and/	or have information recorded in log book, or have this done, depending on institutional procedures. j. May indicate to appropriate staff person when the performer is ready to proceed with next examination.

TASK DESCRIPTION SHEET

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This is page 1 of 14 for this task.

1. **What is the output of this task?** **(Be sure this is broad enough to be repeatable.)**

Requisition reviewed;pt. reassured,positioned,measured;films identified;technical factors selected and set for fluoroscopy,spot filming and overheads; scouts taken;radiologist assisted with instillation of contrast,positioning,fluoroscopy;overhead exposures made;radiographs sent for processing,taken to radiologist;procedures repeated as ordered;pt. returned;examination recorded;arthrograms placed.

2. **What is used in performing this task?** **(Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)**

Pt.'s x-ray requisition sheet,ID card,ID bracelet, medical-technical history,prior radiographs,scouts; view boxes;pen;x-ray generator,control panels,tube, bucky,table,collimator,extension cones;fluoroscopy unit,image intensifier,spot film device,TV monitor; cassettes,roll film;R-L and ID markers;typewriter; sterile gloves,procedure tray;emergency cart;contrast medium;protective lead shielding;immobilization devices;technique,standard view,tube rating and rad exposure charts;calipers;phantom or test object; stretcher or wheelchair;intercom;specimen container; order forms;restraining devices

3. **Is there a recipient, respondent or co-worker involved in the task?** Yes...(X) No...( )

4. **If "Yes" to q. 3:** **Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.**

Patient to have arthrography;accompanying adult; radiologist;co-workers;nurse

5. **Name the task so that the answers to questions 1-4 are reflected. Underline essential words.**

Taking positive contrast arthrograms (especially of knee) of any patient,by reviewing request;preparing equipment;preparing and reassuring pt.;measuring part;setting up for fluoroscopy and spot filming; arranging for scout films as ordered;selecting and setting technical factors;identifying films;providing shielding;assisting with instillation of contrast,positioning of patient,fluoroscopy, and spot filming;taking overhead radiographs as ordered; arranging for processing;taking to radiologist;continuing,repeating as ordered;having pt. returned; placing arthrograms for use;recording examination.

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Performer receives or obtains the x-ray requisition form, patient identification card, and any appropriate medical-technical history for a patient scheduled for positive contrast arthrography (radiographic study of the joints, especially knee, after injection of contrast medium into the joint) as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.
d. From co-worker.

Depending on institutional arrangements, performer may also receive prior films or scout film(s) already taken by co-worker with record of technical factors used and/ or any changes necessary.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided:

    a. Performer checks the examination called for including the joint involved and the affected side, the purpose of the study, and any special requests. Notes the name of the radiologist in charge; may note the name of the referring clinician.

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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b. Performer reads patient's name, identification number, sex, age, weight, and height. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information or note on known pathology that could affect patient positioning, technique, or handling of the patient, such as acute injury, fracture, recurring dislocation. Notes whether there is history of allergies.

c. Performer notes whether fluoroscopy will be combined with spot filming and overhead radiography. Notes whether the use of a grid or bucky will be involved, shielding needed. Notes any special requests.

d. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter or similar device in place; notes whether patient will be accompanied by nurse or other staff person.

e. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete.

  i) Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether there is history of extensive radiography to bring to radiologist's attention.

  ii) Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

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  iii) Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.

  iv) If patient's record indicates orders for sedation or any other prior medication, performer may check timing to be sure a proper elapse of time has occurred for medication to take effect.

f. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer brings this to attention of radiologist in charge. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

g. If referring physician has requested that films already on file be presented with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. Performer goes to appropriate room for the type of examination involved and the equipment required, or notes room assigned on requisition sheet. Checks that x-ray equipment is provided with small fractional focal spot and that overhead, and fluoroscopy capabilities are available.

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Prepares ahead so as not to keep patient in examination room longer than necessary:

a. Washes hands as appropriate.
b. Checks that procedure tray has been prepared for the joint involved or decides to do personally. Checks that emergency cart is present.
c. Checks that proper accessories are available for procedure including special frame or other restraining device and equipment for applying stress to the joint. Checks for leaded rubber shielding, aprons, and gloves to be used by performer, radiologist, the patient, and/or anyone who will remain in the room during exposure.
d. Performer checks that appropriate immobilization devices are present, and that there is a mattress, pads, pillows and/or blankets on the table for comfort of patient. Makes sure that right (R) and left (L) markers are available for use and identification card or leaded numerals or markers.
e. Performer makes sure that an adequate supply of loaded cassettes or other film holders of the appropriate types and sizes for overhead filming are available in the examination room. If not, arranges to obtain or decides to obtain personally.
f. Performer prepares for identification of overhead films using equipment provided by institution:

    i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
    ii) Performer may prepare for use of flashcard by checking that

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    there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
    iii) Checks identification against requisition sheet.

g. If examination will include spot-filming using a camera (attached to image intensifier) and roll film, performer checks film supply indicator to make sure that there is sufficient film in the roll film cassette.

    i) If there is insufficient roll film in camera, performer arranges to have roll film cassette loaded, or decides to do personally.
    ii) When loaded roll film cassette is obtained, performer checks loading in subdued light. Checks that end of film is cut correctly and is properly threaded and attached to take-up spool so that film unwinds appropriately. Checks that film is properly engaged on sprocket. Locks into operating position. If appropriate, cuts off excess film at exit port and removes. Attaches film cassette to camera and locks into place. Replaces camera cover.
    iii) If there is an adequate film supply, checks that film is properly loaded.
    iv) Performer advances film to compensate for any exposure of film due to installation or check.
    v) Removes dark slide from camera lens.
    vi) If not already done, performer writes or types a card with

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patient's identification information for use with spot film device. Inserts in slot in spot film camera as appropriate.

h. If examination will include spot filming using a cassette/bucky spot film device, performer checks that there is an adequate supply of appropriate size cassettes in room.

   i) If there is insufficient supply of cassettes, arranges to obtain or decides to obtain personally.
   ii) Performer prepares for identification of the spot film cassettes as for overhead films.
   iii) Performer may use controls or manually pull out spot film bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position.
   iv) If R-L markers are to be used with spot filming, performer tapes into place on image intensifier screen or plans to tape to patient's body.

i. If a grid will be used with the image intensifier for fluoroscopy and/or spot filming, performer positions and centers grid if not already done. May use control button or slides grid into position. May check that the grid is oriented toward the x-ray

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tube, with grid lines parallel to the long axis of the tube.

3. Performer preselects technical exposure factors for overheads, fluoroscopy and spot filming, based on standards set by the institution as appropriate for examination involved:

   a. Dons protective leaded rubber garments such as apron and gloves.
   b. Makes sure that no one is in examination room or control room.
   c. Performer reviews the technique chart(s) for the unit(s) to be used:

      i) Locates information for body views involved. Takes note of the exposure factors to be used for overheads, fluoroscopy, and spot filming. Considers preferences of the radiologist involved.
      ii) Notes any newly posted changes in technical factors (to reflect accommodation to a change in machine output or a policy decision).
      iii) Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

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d. In the control room performer makes sure that indicator light shows that x-ray generator is "warmed up" and ready for use. Makes sure that all circuits have been stabilized. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.

e. As appropriate, performer sets x-ray generator mode selector(s) to fluoroscopic mode and for use of spotfilm camera or cassette device, and/or overhead filming.

f. Performer sets controls on image intensifier for spotfilm camera or cassette device:

  i) For spotfilm camera, performer selects and sets the rate (frames per second) for the camera according to standards set for examination.

  ii) For cassette spotfilming performer may select and set a standard spotfilm program providing for format combinations such as single, half, or quarter combinations on a single cassette and related spotfilm sizes. Selects program appropriate for examination or awaits orders from radiologist.

g. If not already done, performer connects TV monitor to power outlet. Turns on monitor and checks that "ready" light is on.

h. If appropriate, performer selects the proper field size selector (if there is dual image intensifier).

i. Performer selects and sets exposure factors for fluoroscopy:

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  i) Selects and sets the kVp at standard setting for the examination. May check indicator dial. With automatic density control, sets density selector as appropriate for examination.

  ii) If mA is automatically controlled according to patient thickness, performer turns fluoroscope mA selector to maximum standard position. If not automatically controlled, sets as appropriate for focal spot size and examination involved.

  iii) Sets fluoroscopic examination timer to maximum position.

j. If appropriate, performer selects and sets exposure factors for spot filming:

  i) For conventional manual exposure control, performer selects and sets the appropriate spotfilm time for the examination.

  ii) For automatic, phototimed exposure control, performer selects a density exposure control appropriate for the examination.

  iii) Performer selects the appropriate mA for the examination and the focal spot size to be used.

  iv) Performer selects and sets kVp by combining settings on one major and one minor kVp selector as appropriate for the examination.

4. Performer returns to examination room to set up x-ray and fluoroscope tube(s), image intensifier, colli-

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mator and accessories, as appropriate, for check of equipment prior to examination:

- a. Makes sure that no one is in room.
- b. Places phantom or appropriate test object on radiography table where patient's area of interest will be centered for examination.
- c. Adjusts fluoroscopic tube stand (above or below table) so that tube is at zero degrees and centered to the area of interest.
- d. If not already done, moves image intensifier and any spot film device into position; centers (over or under) the area of interest.
- e. Performer adjusts the x-ray tube to appropriate focal spot/object distance (target to skin distance, TOD). For fluoroscopy adjusts distance between focal spot and image intensifier (focal spot to film distance, FFD). Makes sure that TOD is 15 inches or more. Operates controls or manually moves the x-ray tube(s) into place. Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD is obtained.
- f. Performer collimates fluoroscopy tube (and x-ray tube used for spotfilming if different), depending on nature of the equipment and controls:

  - i) Adjusts fluoroscopy beam shutters to the field size anticipated for fluoroscopic examination or sets shutter mode selector to automatic collimation.
  - ii) Manually sets collimator for the spotfilm field size to be used, or selects and sets field size control to be used for automatic collimation with

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programmed spotfilm cassette exposure sequence.

- g. If appropriate, performer attaches or sets up footboard at end of tilt-table; adjusts or attaches shoulder rest, hand grips if required.

5. Performer checks functioning of equipment by entering remote control room or operating controls in examination room behind leaded screen:

   - a. To check fluoroscopy mode, performer turns on TV power switch controls as appropriate. Activates fluoroscope exposure by pressing footswitch or as appropriate. Views test object being fluoroscoped on TV monitor.

     - i) Performer adjusts kVp control (and mA control if appropriate) and observes effects on TV monitor to be sure that equipment is operating properly.
     - ii) Checks mA meter and notes whether appropriate reading is obtained.
     - iii) Performer checks that TV brightness controls are operating and adjusts for preliminary viewing.
     - iv) Checks examination timer by noting whether time elapse indicator moves during exposure showing decreasing time left for examination. May check that exposure is terminated when maximum examination exposure time is reached.

   - b. To check spotfilm functioning, performer may move cassette or roll film into x-ray exposure field using appropriate controls.

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- i) Performer activates controls for spotfilm exposure. Notes whether cassette or roll film transport is operating appropriately. Notes whether exposure is terminated by phototimer or, if manual timer, in time set. If appropriate, releases spotfilm control after exposure.
- ii) If equipment is operating appropriately, performer unloads cassette and reloads or advances roll film as appropriate. Moves bucky out of way until fluoroscopy is completed.

c. After the performer has checked the equipment, resets for standard exposure factors. If performer decides that any of the fluoroscopic equipment is not functioning properly, performer informs appropriate staff member. Arranges for alternate unit to be used.

6. When fluoroscopy equipment has been set up, performer may note whether preliminary radiographs (scout films) have already been made of the patient (done by another radiologic technologist if work is organized in this way at institution).

   a. If scout films have already been made and viewed by radiologist, performer notes the technique used or ordered and sets up technical factors for any overhead radiography, adjusting for use of contrast medium.
   b. If scout films have been made but not approved, performer places processed scout films and any prior films with patient's chart or places on view boxes for viewing by radiologist.

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   c. If scout films have not been made and are required before patient is seen by radiologist, performer arranges to take "plain films" of the joint in standard positions. Plans to proceed as for plain film radiography after readying patient.

7. Performer readies patient for examination by radiologist:

   a. Performer washes hands as appropriate. Depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
   b. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.
   c. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.
   d. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.
   e. Performer has patient assume a comfortable recumbent or seated position, as appropriate.

      - i) If appropriate, places mattress, pillow or clean linen on x-ray table.
      - ii) If patient is in wheelchair may move patient in chair into po-

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sition next to table. Makes sure that wheelchair is in locked position.

  iii) Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way that may be collided with by patient.
  iv) If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.
  v) If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move or have patient moved to table.
  vi) Has patient rest in as relaxed a position as possible. May place pad, blanket or pillow under bony prominences to provide comfort for recumbent patient.

f. Makes sure that there is no clothing or jewelry on area of interest. Permits patient to keep covered with gown until measurements are taken and until exposure. Treats young patient with as much courtesy as adult.

g. Performer explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

  i) If not already done, may question patient or accompanying adult about any allergies to shellfish or adverse reactions to contrast medium (especially iodine based). Checks whether an allergy test is required. Plans to notify radiologist if any sensitivity should be brought to his or her attention.

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  ii) Performer may explain to patient what side effects may be felt from contrast medium such as feeling of nausea, flushing, choking sensation.
  iii) If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer plans to inform radiologist and to proceed only with approval.
  iv) Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains, when asked medical questions, that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

h. Unless measurements have already been made, and depending on the joint to be radiographed, performer uses centimeter calipers to measure the thickness of the part. Measures in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining

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exposure factors for overheads. After measuring, has patient rest in as relaxed a position as possible.

i. Performer may tape R or L marker to patient if appropriate for use in spot filming.
j. If appropriate before radiologist's examination, performer arranges to take "plain film" scouts and have them processed at once.

8. Performer informs attending radiologist when patient is ready to be examined. Brings requisition sheet, patient's medical history, chart, scout films (if already done) and any prior films, to radiologist. Displays radiographs on view boxes.

   a. If not already done, performer tells radiologist about any difficulties encountered with regard to information, possible contraindications or anything else that should be brought to radiologist's attention. Notes any special orders or change in procedure decided by radiologist. Proceeds as ordered.
   b. Performer may accompany radiologist to examination room and introduce patient to radiologist.
   c. If not already done, performer awaits and carried out radiologist's orders for scout films and proceeds as appropriate for body part.

9. During radiologist's review of requisition, scouts, prior films and examination of patient, performer notes radiologist's orders for any changes in the technical factors, materials to be used in procedure, orders for overhead radiographs; discusses sequence and timing for procedure. May arrange signals for exposure, changing of spotfilm cassettes, operation of exposure controls.

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   a. If radiologist decides to cancel procedure, performer arranges to terminate and reschedule as appropriate.
   b. Performer arranges to provide or change any equipment or supplies as ordered by radiologist.
   c. Arranges to have patient prepared for sterile injection of local anesthetic and contrast, or decides to do personally. Has area around joint shaved if appropriate. Has a container labeled and prepared to receive sample of fluid from joint, or decides to do personally.
   d. Changes or adjusts technical factors and settings as appropriate for fluoroscopy and spot filming. For overhead radiographs, performer notes needed adjustment of technical factors from those used for scout film(s) to allow for use of contrast material; notes any changes requested by radiologist in views or positions. Resets technical exposure factors as appropriate for overheads:

      i) Enters control room and sets controls for appropriate mode.
      ii) For conventional exposure control, performer selects milliamperage and chooses selectors for the correct focal spot size. Selects and sets the exposure time that will produce the mAs desired. Sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.
      iii) For automatic phototimed exposure control, performer selects and sets the category corresponding to the type of study and use or nonuse of screens, bucky, etc., and, if

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appropriate, focal spot size. Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).

May select and set a kVp range button (if called for with equipment) corresponding to range for examination.

Sets a density selector corresponding to the usual (or special) requirements for the study. Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.

iv) Depending on the equipment, may set controls to provide for use of bucky, manual adjustment of table and tube height, position, and of collimation, unless these have already been set.

10. Performer may assist with injection of contrast medium.

  a. May help position patient as appropriate.
  b. Performer gives leaded gloves and apron to radiologist. If appropriate, places leaded curtain in place. Provides patient and everyone remaining in room with appropriate protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.
  c. Washes hands as appropriate observing sterile technique.
  d. If appropriate, performer opens packet of sterile gloves for radiologist, observing sterile technique so that wrapper, own hands, or other objects will not contaminate gloves.
  e. May assist in sterile surgical techniques as appropriate by handing materials asked for.

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  f. May check and help prepare syringes with local anesthetic and contrast medium as ordered.
  g. When radiologist aspirates fluid from joint, performer may assist in transferring of fluid from syringe to sterile, labeled container; performer caps and arranges to send for laboratory testing.

11. Performer assists radiologist during fluoroscopic viewing of progress of injection:

  a. On signal from radiologist, performer may dim room lights. Turns on TV power switch. May go to control room and operate fluoroscope and spot film controls on orders from radiologist. Adjusts kVp and/or mA controls according to radiologist's orders.
  b. Performer may operate tilt table on orders from radiologist, or assist in positioning patient as ordered.

12. After radiologist distributes contrast medium in joint, performer, on orders, attaches special frame or other equipment to table for use in application of stress.

  a. May adjust or help strap joint into position in frame, or positions other apparatus as ordered.
  b. Helps position patient as ordered for viewing the medial meniscus (of knee), and lateral meniscus.

13. Performer assists radiologist during fluoroscopic examination and spot filming by operating exposure controls as ordered or positioning table or tube as ordered.

  a. Performer may slide extension cone into place under image intensifier.

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b. If spotfilm attachment uses cassettes, performer may unload as used, identify, and insert additional cassettes, as described above, throughout procedure.

c. Depending on institutional procedures, performer may keep radiologist informed of cumulative exposure as shown on fluoroscope timer indicator.

d. For viewing of cruciate ligaments, performer removes frame and restraints. Assists as above; assists similarly for viewing of lateral and medial patellar cartilage.

14. Performer carries out overhead radiography as ordered by radiologist. Performer may discuss what movement is possible to determine the positions available for use, or performer may assist while radiologist positions patient for overheads.

a. Performer readjusts technical factors for first (or next) overhead radiograph if any change was ordered.

b. Identifies cassette and places right or left marker on film holder or table top as appropriate to the study and projection, or depresses appropriate R or L button for automatic marking. Places cassette, in position on table or in bucky.

c. Performer positions as ordered as for plain films. Centers to the joint area of interest and keeps the long axis of the part parallel to the film holder. May explain or demonstrate to patient what is required. May obtain help in positioning. When using a bucky, centers patient to midline. With cassette on table top, centers film to part. With upright holder adjusts height of holder to part.

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d. Performer sets the focal-film distance, if not already done, as appropriate to the study.

e. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size. Uses cross-hair shadows as reference for center of field. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired.

f. Once the patient has been positioned and immobilized, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). Performer attaches an auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the part(s) of interest.

g. Rechecks that patient has been properly shielded.

h. Performer rehearses patient in holding still during exposure until told to relax.

i. Throughout procedure performer remains alert for any sympton of adverse reaction, especially reaction to contrast such as severe flushing, salivation, choking, vomiting, pallor, fainting, or shock. As soon as performer judges that reaction may be severe, ceases exposure and notifies radiologist or attending physician at once.

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j. When everything is ready for the exposure, performer reminds patient to hold still during exposure. Observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

k. Performer returns to control room. Makes sure controls are properly set, that equipment is set for radiography mode, and that patient is still in position. Tells patient when to hold still as rehearsed by calling or using intercom. Initiates exposure by pressing hand trigger or exposure control button.

   i) While exposure is underway, performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
   ii) May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.
   iii) With phototimer notes whether backup timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure.
   iv) After exposure is completed tells patient that he or she can relax.
   v) If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.
   vi) After exposure removes cassette and removes markers for further use.

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   vii) Repeats radiography for all the exposures ordered by radiologist, adjusting technical factors, tube, and position of patient or film holder as appropriate to each view ordered. Repeats identification, collimation, shielding and exposure as above.

15. After spotfilming and overhead filming is completed, or when ordered by radiologist, performer arranges to have spot films and overhead arthrograms processed:

   a. May sign or have radiologist sign requisition sheet.
   b. Checks that equipment is turned off.
   c. With cassette spot films or overhead exposures removes any markers for further use. Attaches ID card for use with flasher if appropriate.
   d. With spotfilm camera, performer advances the film so that all exposures made will be wound on the take-up spool in the roll film cassette. Replaces dark slide on camera lens. Uses device to cut film and create a light shield. Resets counter and removes film cassette.
   e. Removes any markers from patient's body.
   f. Performer arranges to have spot films and overheads processed at once if appropriate or decides to process personally.
   g. While films are being processed, makes sure that patient is comfortable and, if necessary, attended by radiologist, staff member, or self.

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16. Performer brings the processed spot films and radiographs directly to the radiologist in charge or places on view boxes and informs radiologist that they are ready. May hang prior films and scouts.

    a. Performer notes any order for repeat of any part of fluoroscopic examination. Changes technical factors as ordered. Assists in continued examination as described above, repeating appropriate steps.
    b. If the radiologist indicates that there is any problem with the technical factors or the patient positioning for overheads, performer records or notes for use in "retakes."
    c. When (or if) performer learns from the radiologist that further conventional overheads or special projections are to be made, performer proceeds as appropriate according to instructions.
    d. For further overhead exposures performer repeats appropriate steps including identification of cassette, use of R-L marker, selection and setting of technique, positioning patient and equipment for focus-object-film alignment, collimation, shielding, breathing instructions, making exposure, and processing, as described above.
    e. Performer refrains from commenting on the films or providing any interpretation.
    f. If performer is asked to repeat any exposures, performer notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."

        i) If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member.

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        ii) If request for retakes reflects the preference for density or contrast of the radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.

    g. Performer shows subsequent sets of radiographs to radiologist as processed, and proceeds as described above until radiologist indicates that examination is completed.
    h. Performer notes any orders for a repeat of examination at a later time. May have radiologist fill out requisition sheet. May arrange for scheduling.

17. When the radiologist indicates that the radiography is completed, performer carries out termination steps:

    a. May make sure that all equipment is turned off.
    b. Performer may have patient cleansed; may have room and equipment cleaned; has any other appropriate clean up procedures followed to avoid infection or contamination, or decides to do personally, depending on institutional arrangements.
    c. May decide to assist patient from table or to chair. Makes sure patient is reminded of any footrest in stepping off table. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient.
    d. If delayed films are ordered requiring a specific period of time to elapse, performer arranges to have patient taken to appropriate holding area. Keeps track of the time elapsed. Follows steps as appropriate, as described above.

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e. Performer may have patient transported back to holding area or next location, or decides to do personally, as appropriate. If appropriate, makes sure that patient is in the care of a staff person who will transport to appropriate next location or, if out-patient, will arrange to discharge or send patient home. f. Performer records the examination according to institutional procedures. May include date, room, examination type, the overhead views taken, the technical factors used, and film sizes. Performer may record the number of exposures made of each overhead view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. Signs requisition sheet. g. Performer may record the fluoroscopy examination including exposure time and rad dôsage. h. May present requisition form to radiologist for comments and signature. i. Performer may decide to jacket radiographs, requisition sheets, and related materials, and/or have information recorded in log book personally, or have this done, depending on institutional procedures. j. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

TASK DESCRIPTION SHEET

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1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured;part measured; films identified;technical factors selected and set for fluoroscopy,spot filming,overheads;scouts taken; radiologist assisted with instillation,positioning, fluoroscopy;pt. instructed in cough suppression;overhead exposures made;radiographs sent for processing, taken to radiologist;procedures repeated as ordered for other side,delayed films;pt. returned;examination recorded;bronchograms placed for use.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, medical-technical history,prior radiographs,scouts; view boxes;pen;x-ray generator,control panels,tube, bucky,table,collimator;fluoroscopy unit,image intensifier,spot film device,TV monitor;cassettes;roll film;R-L,ID markers;procedure tray;emergency cart; contrast medium;heater;emesis basin;pad;towels;protective lead shielding;immobilization devices;technique,standard view,tube rating and rad exposure charts;calipers;phantom or test object;stretcher or wheelchair;intercom;order forms;instruction sheet

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-pediatric patient to have bronchography;radiologist;co-workers;nurse

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Taking bronchograms of a non-pediatric pt., by reviewing request;preparing equipment;preparing and reassuring pt.; measuring chest;setting up for fluoroscopy and spot filming;arranging for scout films as ordered;setting technical factors;identifying films; providing shielding;assisting with instillation of catheter,contrast,positioning of pt.,fluoroscopy, spot filming;taking overhead bronchograms as ordered; arranging for processing;taking to radiologist;continuing,repeating as ordered for second side,delayed filming;assisting in removal of contrast;having pt. returned;placing bronchograms for use;recording.

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Performer receives or obtains the x-ray requisition form, patient identification card, and any appropriate medical-technical history for a non-pediatric patient scheduled for bronchography (radiographic examination of the lung(s) and bronchi after instillation of iodized oil contrast medium in bronchus) as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.
d. From co-worker.
e. Having arranged, on orders, or received orders to proceed with bronchography of patient who has just undergone bronchoscopy (with bronchoscope or catheter still in place).

Depending on institutional arrangements, performer may also receive scout film(s) already taken by co-worker with record of technical factors used and/or any changes necessary.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided:

    a. Performer checks the examination called for including the areas involved and the affected side(s),

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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the purpose of the study, and any special requests. Notes the name of the radiologist in charge; may note the name of the referring clinician. Notes whether erect or recumbent positioning is called for, views ordered, breathing instructions, whether a bilateral or unilateral study is requested.

b. Performer reads patient's name, identification number, sex, age, weight, and height. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information or note on known pathology that could affect patient positioning, technique, or handling of the patient, such as acute injury, presence of taping. Notes whether there is history of allergies, whether patient will be on a stretcher or in a wheelchair. Notes whether the use of a grid or bucky will be involved, shielding needed. Notes any special requests.

c. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter or similar device in place; notes whether patient will be accompanied by nurse or other staff person.

d. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete.

  i) Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether there is history of extensive radiography to bring to radiologist's notice.

  ii) Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

  iii) Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.

  iv) Notes orders for prior abstinence from food and drink, use of postural drainage, prior medication and/or sedation. May check whether these have been carried out; performer may check timing to be sure a proper elapse of time has occurred for medication or sedation to take effect.

e. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer brings this to attention of radiologist in charge. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

f. If referring physician has requested that films already on file be presented with current radiographs,

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and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. Performer goes to appropriate room for the type of examination involved and the equipment required, or notes room assigned on requisition sheet. Prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Washes hands as appropriate.
   b. Checks that procedure tray has been prepared for the study involved or decides to do personally. Checks that emergency cart is present.
   c. Checks that proper accessories are available for procedure including leaded rubber shielding, aprons, and gloves to be used by performer, radiologist, the patient, and/or anyone who will remain in the room during exposure.
   d. Performer checks that appropriate immobilization devices are present, and that there is a mattress, pads, pillows and/or blankets for comfort of patient if patient will lie on table. Makes sure that right (R) and left (L) markers are available for use and identification cards,or leaded numerals or markers.
   e. For overhead filming performer makes sure that an adequate supply of loaded cassettes and appropriate film holder are available in the examination room. Selects appropriate speed and type of film, grid and cassette combination depending on whether a bucky, table top, or automatic chest x-ray technique will be used and standard institutional practices. If not in room,arranges to obtain or decides to obtain personally.

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   f. Performer prepares for identification of overhead films using equipment provided by institution:

      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
      iii) Checks identification against requisition sheet.

   g. If examination will include spot filming using a camera (attached to image intensifier) and roll film, performer checks film supply indicator to make sure that there is sufficient film in the roll film cassette.

      i) If there is insufficient roll film in camera, performer arranges to have roll film cassette loaded, or decides to do personally.
      ii) When loaded roll film cassette is obtained, performer checks loading in subdued light. Checks that end of film is cut correctly and is properly threaded and attached to take-up spool so that film unwinds appropriately. Checks that film is properly engaged on sprockets. Locks into operating position. If appropriate, cuts off excess film at exit port

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and removes. Attaches film cassette to camera and locks into place. Replaces camera cover.

- iii) If there is an adequate film supply, checks that film is properly loaded.
- iv) Performer advances film to compensate for any exposure of film due to installation or check.
- v) Removes dark slide from camera lens.
- vi) If not already done, performer writes or types a card with patient's identification information, for use with spotfilm device. Inserts in slot in spotfilm camera as appropriate.

h. If examination will include spot filming using a cassette/bucky spotfilm device, performer checks that there is an adequate supply of appropriate size cassettes in room.

- i) If there is insufficient supply of cassettes, arranges to obtain or decides to obtain personally.
- ii) Performer carries out identification of the spotfilm cassettes as for overhead films.
- iii) Performer may use controls or manually pull out spotfilm bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position.
- iv) If R-L markers are to be used with spot filming, performer tapes into place on image intensifier screen or plans to tape to patient's body.

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i. If a grid will be used with the image intensifier for fluoroscopy and/or spot filming, performer positions and centers grid if not already done. May use control button or slides grid into position. May check that the grid is oriented toward the x-ray tube, with grid lines parallel to the long axis of the tube.

3. Performer reviews technical exposure factors for overheads, fluoroscopy and spot filming, based on standards set by the institution as appropriate for the examination involved:

a. Dons protective leaded rubber garments such as apron and gloves.

b. Makes sure that no one is in examination room or control room.

c. Performer reviews the technique chart(s) for the unit(s) to be used:

- i) Locates information for the chest views involved. Takes note of the exposure factors to be used for overheads, fluoroscopy, and spot filming. Considers preferences of the radiologist involved.
- ii) Notes any newly posted changes in technical factors (to reflect accommodation to a change in machine output or a policy decision).
- iii) Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent

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output using higher kVp and lower mAs.

d. In the control room, performer makes sure that indicator light shows that x-ray generator is "warmed up" and ready for use. Makes sure that all circuits have been stabilized. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.

e. As appropriate, performer sets x-ray generator mode selector(s) to fluoroscopic mode and for use of spot film camera or cassette device, and overhead filming.

f. Performer sets controls on image intensifier for spot film camera or cassette device:

  i) For spot film camera, performer selects and sets the rate (frames per second) for the camera according to standards set for examination.

  ii) For cassette spot filming performer may select and set a standard spot film program providing for format combinations such as single, half, or quarter combinations on a single cassette and related spot film sizes. Selects program appropriate for examination or awaits orders from radiologist.

g. If not already done, performer connects TV monitor to power outlet. Turns on monitor and checks that "ready" light is on.

h. If appropriate, performer selects the proper field size

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selector (if there is dual image intensifier).

i. Performer selects and sets exposure factors for fluoroscopy:

  i) Selects and sets the kVp at standard setting for the examination. May check indicator dial. With automatic density control, sets density selector as appropriate for examination.

  ii) If mA is automatically controlled according to patient thickness, performer turns fluoroscope mA selector to maximum standard position. If not automatically controlled, sets as appropriate for focal spot size and examination involved.

  iii) Sets fluoroscopic examination timer to maximum position.

j. If appropriate, performer selects and sets exposure factors for spot filming:

  i) For conventional manual exposure control, performer selects and sets the appropriate spotfilm time for the examination.

  ii) For automatic, phototimed exposure control, performer selects a density exposure control appropriate for the examination.

  iii) Performer selects the appropriate mA for the examination and the focal spot size to be used.

  iv) Performer selects and sets kVp by combining settings on one major and one minor kVp selector as appropriate for the examination.

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4. Performer returns to examination room to set up x-ray and fluoroscope tube(s), image intensifier, collimator and accessories, as appropriate, for check of equipment prior to examination:

   a. Makes sure that no one is in room.
   b. Places phantom or appropriate test object on radiography table where patient's area of interest will be centered for examination.
   c. Adjusts fluoroscopic tube stand (above or below table) so that tube is at zero degrees and centered to the area of interest.
   d. If not already done, moves image intensifier and any spot film device into position; centers (over or under) the area of interest.
   e. Performer adjusts the x-ray tube to appropriate focal spot object distance (target to skin distance, TOD). For fluoroscopy adjusts distance between focal spot and image intensifier (focal spot to film distance, FFD). Makes sure that TOD is 15 inches or more. Operates controls or manually moves the x-ray tube(s) into place. Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD is obtained.
   f. Performer collimates fluoroscopy tube (and x-ray tube used for spot filming if different), depending on nature of the equipment and controls:

      i) Adjusts fluoroscopy beam shutters to the field size anticipated for fluoroscopic examination or sets shutter mode selector to automatic collimation.
      ii) Manually sets collimator for the spotfilm field size to be used, or selects and sets field size control to be used for automatic collimation with programmed spot film cassette exposure sequence.

   g. If appropriate, performer attaches or sets up footboard at end of tilt-table; may adjust or attach shoulder rest, hand grips, compression band.

5. If not already done, performer checks functioning of fluoroscopy equipment by entering remote control room or operating controls in examination room behind leaded screen:

   a. To check fluoroscopy mode, performer turns on TV power switch controls as appropriate. Activates fluoroscope exposure by pressing footswitch or as appropriate. Views test object being fluoroscoped on TV monitor.

      i) Performer adjusts kVp control (and mA control if appropriate) and observes effects on TV monitor to be sure that equipment is operating properly.
      ii) Checks mA meter and notes whether appropriate reading is obtained.
      iii) Performer checks that TV brightness controls are operating and adjusts for preliminary viewing.
      iv) Checks examination timer by noting whether time elapse indicator moves during exposure showing decreasing time left for examination. May check that exposure is terminated when maximum examination exposure time is reached.

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b. To check spot film functioning, performer may move cassette or roll film into x-ray exposure field using appropriate controls.

i) Performer activates controls for spot film exposure. Notes whether cassette or roll film transport is operating appropriately. Notes whether exposure is terminated by phototimer or, if manual timer, in time set. If appropriate, releases spot film control after exposure.

ii) If equipment is operating appropriately, performer unloads cassette and reloads or advances roll film as appropriate. Moves bucky out of way until fluoroscopy is completed.

c. After equipment has been checked, performer shuts and resets for standard exposure factors. If performer decides that any of the fluoroscopic equipment is not functioning properly, performer informs appropriate staff member. Arranges for alternate unit to be used.

6. When fluoroscopy equipment has been set up, performer may note whether preliminary radiographs (scout films) have already been made of the patient (done by another radiologic technologist if work is organized in this way at institution).

a. If scout films have already been made and viewed by radiologist, performer notes the technique used or ordered and sets up technical factors for any overhead radiography, adjusting for use of contrast medium.

b. If scout films have been made but not approved, performer places processed scout films and any prior films with patient's chart or places on view boxes for viewing by radiologist.

c. If scout films have not been made and are required before patient is seen by radiologist, performer arranges to take "plain films" of the chest in standard positions, depending on orders for unilateral or bilateral studies and erect or recumbent positions for bronchograms. Plans to proceed as for plain film radiography after readying patient.

7. Performer readies patient for examination by radiologist:

a. Performer washes hands as appropriate. Depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.

b. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

c. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

d. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

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e. If patient has just undergone bronchoscopy and bronchoscope or catheter is still in place, performer proceeds directly to preparations for removal of bronchoscope and/or instillation of contrast medium by radiologist, and is careful in handling patient.

f. Performer has patient assume a comfortable recumbent or seated position, as appropriate.

  i) If appropriate, places mattress, pillow or clean linen on x-ray table.

  ii) If patient is in wheelchair may move patient in chair into position next to table. Makes sure that wheelchair is in locked position.

  iii) Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way that may be collided with by patient.

  iv) If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.

  v) If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move or have patient moved to table.

  vi) Has patient rest in as relaxed a position as possible. May place pad, blanket or pillow under bony prominences to provide comfort for recumbent patient.

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g. If not already done, has patient's clothing removed to the waist and provides gown or drape. May assist patient or request assistance from nurse if there is an injury involved. Makes sure that patient removes any dentures. Permits patient to keep covered with gown until measurements are taken and until exposure. Treats young patient with as much courtesy as adult.

h. If patient has adhesive strapping in place, performer notes whether it is old and wrinkled and requires removal before radiography. If so, performer indicates this to appropriate staff member and waits for removal and restrapping by RN or MD.

i. Performer notes the patient's body type, whether the area of interest is heavily covered by muscle or soft fat, whether the palpation points will be easy to find. Notes whether the extremities are of unequal length. For female patients, performer judges whether the breasts are large and pendulous. If so, may plan to have patient or staff member draw the breasts to the sides and hold in place with wide bandage or by having erect patient lean breasts against erect cassette holder.

j. If patient is to be radiographed in erect position, performer adjusts vertical film holder to appropriate height for patient.

8. If not already done, performer explains to patient what will be involved in the procedure:

  a. Indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient.

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b. If not already done, checks that prior preparation such as abstinence from food, administration of medication, and postural drainage have been carried out.

c. If not already done, may question patient or accompanying adult about any allergies to shellfish or adverse reactions to contrast medium (especially iodine based). Checks whether an allergy test is required. Plans to notify radiologist if any sensitivity should be brought to his or her attention. Performer may explain to patient what side effects may be felt from contrast medium such as feeling of nausea, flushing, choking sensation.

d. Unless this will be done by radiologist, performer explains the effects of the instillation of the contrast medium in promoting the coughing reflex. Explains why and when patient needs to exert a real effort to control coughing. Helps patient practice rapid shallow breathing or panting to suppress coughing. Reassures patient about any fears in having air passages entered by catheter and contrast material.

e. If sedative has been administered, performer may make sure that an out-patient has made arrangements to be escorted home and postpone normal activities for the rest of the day.

f. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer plans to inform radiologist and to proceed only with approval.

g. Performer answers patient's nonmedical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains, when asked medical questions, that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

h. Unless measurements have already been made, performer uses centimeter calipers to measure the thickness of the chest in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors for overheads. After measuring, has patient rest in as relaxed a position as possible.

i. Performer may tape R or L marker to patient if appropriate for use in spot filming.

j. If appropriate before radiologist's examination, performer arranges to take "plain film" scouts and have them processed at once.

9. Performer informs attending radiologist when patient is ready to be examined. Brings requisition sheet, patient's medical history, chart, scout films (if already done) and any prior films, to radiologist. Displays radiographs on view boxes.

a. If not already done,performer tells radiologist about any difficulties encountered with regard to information, possible contraindications, or anything else that should be brought to radiologist's attention. Notes any special orders or change in procedure decided by radiologist Proceeds as ordered.

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b. Performer may accompany radiologist to examination room and introduce patient to radiologist.

c. If not already done, performer awaits and carries out radiologist's orders for scout films and proceeds as appropriate for chest radiography in positions ordered. Presents for review as described above.

10. During radiologist's review of requisition, scouts, prior films and examination of patient, performer notes radiologist's orders for any changes in patient positioning and/or technical factors. Notes radiologist's final choice of contrast (depending on allergies) and any other orders. Discusses sequence and timing for procedure. May arrange signals for exposure, changing of spot film cassettes, operation of exposure controls.

a. If radiologist decides to cancel procedure, performer arranges to terminate and reschedule as appropriate.

b. Performer arranges to provide or change any equipment or supplies as ordered by radiologist. Once contrast medium has been selected, performer checks and may help prepare in syringes. Shakes and places in appropriate heating device; checks that contrast medium is maintained at appropriate body temperature until ready for use.

c. Performer changes or adjusts technical factors, program, and settings as appropriate for fluoroscopy and spot filming.

d. For overhead radiographs, performer notes needed adjustment of technical factors from those used for scout film(s) to allow for use of contrast material and any changes requested by radiologist

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in technique or positions. Sets or resets technical exposure factors as appropriate for overheads while radiologist continues with patient:

i) Enters control room and sets control for appropriate mode.

ii) For conventional exposure control, performer selects milliamperage and chooses selectors for the correct focal spot size. Selects and sets the exposure time that will produce the mAs desired. Sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

iii) For automatic phototimed exposure control, performer selects and sets the category corresponding to the type of study and use or nonuse of screens, bucky, etc., and, if appropriate, focal spot size. Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).

May select and set a kVp range button (if called for with equipment) corresponding to range for examination.

Sets a density selector corresponding to the usual (or special) requirements for the study. Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.

iv) Depending on the equipment, may set controls to provide for use of automatic chest x-ray equipment, bucky, manual adjustment of table and tube height, position, and of collimation, unless these have already been set.

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11. Performer may assist radiologist with preparation of patient:

    a. Washes hands as appropriate.
    b. May help position patient as appropriate on or in front of x-ray table.
    c. Performer gives leaded gloves and apron to radiologist. If appropriate, places leaded curtain in place. Provides patient and everyone remaining in room during exposure with appropriate protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.
    d. May open packet of gloves for radiologist and assist with mask and gown.
    e. Unless a bronchoscope is in place, may assist with anesthetization of patient's throat by providing patient with emesis basin and pad (for patient to hold tongue out of mouth). May assist with preparation of catheter. Reassures patient.
    If bronchoscope is in place may assist with preparation of guide wire; may arrange to have bronchoscope sterilized and stored; may assist with preparation of catheter.

12. Performer assists radiologist during fluoroscopic viewing of progress of positioning of catheter and instillation of contrast:

    a. On signal from radiologist, performer may dim room lights. Turns on TV power switch. May go to control room and operate fluoroscope controls on orders from radiologist. Adjusts kVp and/or mA controls according to radiologist's orders.

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    b. Performer may operate tilt table on orders from radiologist, or assist in positioning patient as ordered.

13. After radiologist has instilled contrast medium in bronchus on first side, performer assists radiologist with spot filming:

    a. Operates exposure controls as ordered,or positions table, tube,or patient as ordered.
    b. Comforts patient and encourages to suppress coughing.
    c. If spot film attachment uses cassettes, performer may unload as used, identify, and insert additional cassettes, as described above, throughout procedure.
    d. Depending on institutional procedures, performer may keep radiologist informed of cumulative exposure as shown on fluoroscope timer indicator.

14. When the radiologist indicates that the given side has been sufficiently observed under fluoroscopy and sufficient spot films have been taken, performer proceeds with overhead filming of the bronchi on the side of interest as ordered:

    a. Performer proceeds as rapidly as possible to avoid having patient suppress cough reflex needlessly long.
    b. Performer repeats to patient the need to suppress coughing to avoid spreading the contrast material to the lung fields.
    c. Performer reminds patient of the type of breathing required for the exposure(s), such as breathing in deeply and holding. May rehearse patient.

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d. Performer positions patient in same positions ordered for scout films unless otherwise ordered. Immobilizes as appropriate.

e. Identifies cassette and places right or left marker on film holder or table top as appropriate to the study and projection. Places cassette in position in holder or bucky as appropriate. For chest x-ray equipment using automatic film marking device may place patient's card into card slot or tray and depress appropriate R or L button for automatic marking.

f. Performer sets the focal-film distance, if not already done, as appropriate.

g. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size. Uses cross-hair shadows as reference for center of field. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired.

h. Once the patient has been positioned and immobilized, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). Adjusts primary beam to minimum size needed to cover the part(s) of interest.

i. Rechecks that patient has been properly shielded.

j. Throughout procedure performer remains alert for any sympton of adverse reaction, especially reaction to contrast, such as severe flushing, salivation, choking, vomiting, pallor, fainting, or shock. As soon as performer judges that reaction may be severe, ceases exposure and notifies radiologist or attending physician at once.

k. When everything is ready for the exposure, performer reminds patient of the breath control to be used for exposure. Observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

l. Performer returns to control room. Makes sure controls are properly set, that equipment is set for radiography mode, and that patient is still in position. Tells patient when to breathe and hold as rehearsed,by calling or using intercom. Initiates exposure by pressing hand trigger or exposure control button.

  i) While exposure is underway, performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
  ii) May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.
  iii) With phototimer notes whether backup timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure.
  iv) After exposure is completed tells patient that he or she can relax.

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- v) If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.
- vi) After exposure removes cassette and removes markers for further use.
- vii) Repeats radiography for all the exposures ordered by radiologist for first side, adjusting technical factors, tube, and position of patient or film holder as appropriate to each view ordered. Repeats identification, collimation, shielding and exposure as above. Keeps encouraging patient to suppress cough reflex and reassures.

15. After spot filming and overhead filming is completed for first side, or as ordered by radiologist, performer arranges to have spot films and overhead bronchograms processed:

    a. May sign or have radiologist sign requisition sheet.
    b. Checks that equipment is turned off.
    c. With cassette spot films or overhead exposures,removes any markers for further use. Attaches ID card for use with flasher if appropriate.
    d. With spot film camera, performer advances the film so that all exposures made will be wound on the take-up spool in the roll film cassette. Replaces dark slide on camera lens. Uses device to cut film and create a light shield. Resets counter and removes film cassette.
    e. Removes any markers from patient's body.

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    f. Performer arranges to have spot films and overheads processed at once if appropriate or decides to process personally.
    g. While films are being processed, makes sure that patient is comfortable and, if necessary, attended by radiologist, staff member, or self.

16. Performer brings the processed spot films and radiographs of first side directly to the radiologist in charge or places on view boxes and informs radiologist that they are ready. May hang prior films and scouts.

    a. Performer makes note of radiologist's decisions regarding adequacy of the bronchograms:

        i) If radiologist decides to inject more contrast medium,performer assists as above with filling, fluoroscopy and spot filming. Repeats additional overhead bronchography as ordered.
        ii) If the radiologist indicates that there is any problem with the technical factors or the patient positioning for overheads, performer records or notes for use in "retakes." Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes." If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member. If request for retakes reflects the preference for density or contrast of the radiologist, performer notes for future use to avoid future "retakes."

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iii) If radiologist requires additional views and/or positions, performer repeats overhead filming as appropriate to new projections, as described above.

iv) For further overhead exposures performer repeats appropriate steps including identification of cassette, use of R-L marker, selection and setting of technique, positioning patient and equipment for focus-object-film alignment, collimation, shielding, breathing instructions, making exposure, and processing, as described above.

v) Performer refrains from commenting on the films or providing any interpretation to patient.

vi) Performer shows subsequent sets of spot films and bronchograms of first side to radiologist as processed, and proceeds as described above until radiologist indicates that examination of first side is completed.

b. Performer makes note of radiologist's decision regarding study of the other side:

i) If radiologist decides to examine the other bronchus at once, performer assists with fluoroscopy while radiologist pulls back catheter and enters other bronchus. Assists as described above with instillation, fluoroscopy and spot filming of second side. Repeats overhead filming for second side as ordered; has bronchograms processed and continues until radiologist indicates that examination of second side is completed.

ii) If radiologist decides to examine the other bronchus at a

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later time, performer may have radiologist fill out requisition sheet. May arrange for scheduling.

17. After bronchography is completed, performer makes note of radiologist's orders for delayed films (post-tussive) after an appropriate elapse of hours and/or orders for postural drainage and post-drainage radiography or tomography after a day or two. May have radiologist fill out and sign appropriate order forms.

18. Performer may assist radiologist in removal of catheter from patient. Provides emesis basin and helps or encourages patient to cough gently and/or spit up contrast medium. Provides patient with towels or tissues.

19. Performer carries out follow-up procedures as appropriate:

a. Performer may have patient cleansed; may have room and equipment cleaned; has any other appropriate clean up procedures followed to avoid infection or contamination, or decides to do personally, depending on institutional arrangements.

b. If appropriate performer reinforces instructions to patient not to eat or drink for an appropriate number of hours because the anesthetized pharynx and larynx could allow material to be aspirated into the tracheobronchial tree. With out-patient, may write out instructions or present printed sheet of instructions to patient. Performer may reinforce explanation of what residual effects may be experienced. Reassures patient.

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c. Performer explains to patient if postural drainage, delayed films, or a later examination has been ordered.

d. If postural drainage and/or delayed films are ordered requiring a specific period of time to elapse, performer arranges to have patient taken to appropriate holding area. Keeps track of the time elapsed.

e. May decide to assist patient from table or to chair. Makes sure patient is reminded of any footrest in stepping off table. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient.

f. For delayed filming performer takes appropriate delayed bronchograms in projections ordered as for plain films and earlier bronchograms. Has delayed films processed and reviewed by radiologist at once as described above.

20. When the radiologist indicates that all the radiography is completed, performer carries out termination steps:

a. Performer may have patient transported to recovery area, for postural drainage,or next assigned location, or decides to do personally, as appropriate. If appropriate, makes sure that patient is in the care of a staff person who will transport to appropriate next location or, if out-patient, will arrange to discharge or send patient home with escort as appropriate.

b. Performer records the examination according to institutional procedures. May include date, room, examination type, the overhead views taken, the technical factors used, and film sizes. May record the number of exposures made of each spot film and overhead view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. Signs requisition sheet.

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c. Performer may record the fluoroscopy examination including exposure time and rad dosage.

d. May present requisition form to radiologist for comments and, signature. May present forms for requisitions for later delayed films and/or additional examination.

e. Performer may decide to jacket radiographs, requisition sheets, and related materials, and/or have information recorded in log book personally, or have this done, depending on institutional procedures.

f. May indicate to appropriate staff person when the performer is ready to proceed with next examination.

TASK DESCRIPTION SHEET

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1. **What is the output of this task?** (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured;chest measured; films identified;technical factors selected and set for fluoroscopy,spot filming,overheads;scouts taken; radiologist assisted with positioning,fluoroscopy spot filming;overhead exposures made;radiographs sent for processing,taken to radiologist;pt. returned;examination recorded;radiographs placed for use.

2. **What is used in performing this task?** (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, medical-technical history,prior radiographs,scouts; view boxes;pen;x-ray generator,control panels,tube, bucky,table,collimator;fluoroscopy unit,image intensifier,spot film device,TV monitor;cassettes;roll film;R-L,ID markers;bronchoscope power-pack,camera; labels,test tubes,slides,lab jars with media,preservative;procedure tray;emergency cart;emesis basin; towels;shielding;immobilization devices;technique, standard view,tube rating,rad exposure charts;calipers;phantom or test object;stretcher;wheelchair; intercom;order forms;instruction sheets

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. **If "Yes" to q. 3:** Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-pediatric pt. to have needle lung biopsy or bronchoscopy;radiologist;co-worker;nurse

5. **Name the task** so that the answers to questions 1-4 are reflected. Underline essential words.

Carrying out radiologic technology for bronchoscopy or needle lung biopsy of a non-pediatric patient, by reviewing request;preparing equipment;preparing and reassuring pt.;measuring chest;setting up for fluoroscopy and spot filming;arranging for scout films as ordered;setting technical factors;identifying films;providing shielding;assisting with positioning of pt.,fluoroscopy,spot filming,removal of bronchoscope;taking overhead chest films as ordered;arranging for processing;taking to radiologist;continuing, repeating as ordered;having pt. returned;placing radiographs for use;recording examination.

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Performer receives or obtains the x-ray requisition form, patient identification card, and any appropriate medical-technical history for a non-pediatric patient scheduled for bronchoscopy or needle lung biopsy as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.
d. From co-worker.

Depending on institutional arrangements, performer may also receive prior films or scout film(s) already taken by co-worker with record of technical factors used and/or any changes necessary.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided:

   a. Performer checks the examination called for including the areas involved, the affected side(s), the purpose of the study, and any special requests. Notes the name of the radiologist in charge; may note the name of the referring clinician. Notes whether erect or recumbent positioning is called for, views ordered, breathing

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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instructions, whether bilateral or unilateral overheads are requested.

b. Performer reads patient's name, identification number, sex, age, weight, and height. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information such as note on known pathology that could affect patient positioning, technique, or handling of the patient, such as acute injury, presence of taping. Notes whether patient will be on a stretcher or in a wheelchair. Notes whether the use of a grid or bucky will be involved, shielding needed. Notes any special requests.

c. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter or similar device in place; notes whether patient will be accompanied by nurse or other staff person.

d. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete.

i) Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether there is history of extensive radiography to bring to radiologist's notice.

ii) Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

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iii) Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.

iv) Notes any orders for prior abstinence from food and drink, use of postural drainage, prior medication and/or sedation. May check whether these have been carried out; performer may check timing to be sure a proper elapse of time has occurred for medication or sedation to take effect.

e. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer brings this to attention of radiologist in charge. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

f. If prior chest radiographs and/or tomograms already on file are to be presented with scout films, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. Performer goes to appropriate room for the type of examination involved and the equipment required, or notes room assigned on requisition sheet.

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Prepares ahead so as not to keep patient in examination room longer than necessary:

a. Washes hands as appropriate.
b. Checks that procedure tray has been prepared for the study involved or decides to do personally. Checks that emergency cart is present.
c. Checks that proper accessories are available for procedure including leaded rubber shielding, aprons, and gloves to be used by performer, radiologist, the patient, and/or anyone who will remain in the room during exposure.
d. For bronchoscopy, may obtain bronchoscope power-pack and camera.
e. Performer checks that appropriate slides, labels and containers for specimens ordered are prepared or decides to do personally.
f. Performer checks that appropriate immobilization devices are present, and that there is a mattress, pads, pillows and/or blankets for comfort of patient if patient will lie on table. Makes sure that right (R) and left (L) markers are available for use and identification cards or leaded numerals or markers.
g. For overhead filming performer makes sure that an adequate supply of loaded cassettes and appropriate film holder are available in the examination room. Selects appropriate speed and type of film, grid, and cassette combination depending on whether a bucky, table top, or automatic chest x-ray technique will be used and standard institutional practices. If not in room, arranges to obtain or decides to obtain personally.
h. Performer prepares for identification of overhead films using equipment provided by institution:

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   i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
   ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
   iii) Checks identification against requisition sheet.

i. If examination will include spot filming using a camera (attached to image intensifier) and roll film, performer checks film supply indicator to make sure that there is sufficient film in the roll film cassette.

   i) If there is insufficient roll film in camera, performer arranges to have roll film cassette loaded, or decides to do personally.
   ii) When loaded roll film cassette is obtained, performer checks loading in subdued light. Checks that end of film is cut correctly and is properly threaded and attached to take-up spool so that film unwinds appropriately. Checks that film is properly engaged on sprockets. Locks into operating position. If appropriate, cuts off excess film at exit port and removes. Attaches film cassette to camera and locks into place. Replaces camera cover.
   iii) If there is an adequate film supply, checks that film is properly loaded.

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- iv) Performer advances film to compensate for any exposure of film due to installation or check.
- v) Removes dark slide from camera lens.
- vi) If not already done, performer writes or types a card with patient's identification information for use with spotfilm device. Inserts in slot in spotfilm camera as appropriate.

j. If examination will include spot filming using a cassette/bucky spotfilm device, performer checks that there is an adequate supply of appropriate size cassettes in room.

- i) If there is insufficient supply of cassettes, arranges to obtain or decides to obtain personally.
- ii) Performer carries out identification of the spotfilm cassettes as for overhead films.
- iii) Performer may use controls or manually pull out spotfilm bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position.
- iv) If R-L markers are to be used with spot filming, performer tapes into place on image intensifier screen or plans to tape to patient's body.

k. If a grid will be used with the image intensifier for fluoroscopy and/or spot filming, performer positions and centers grid if not already done. May use control button or slides grid into position. May check that the grid is oriented toward the x-ray tube, with grid lines parallel to the long axis of the tube.

3. Performer reviews technical exposure factors for overheads, fluoroscopy and spot filming, based on standards set by the institution as appropriate for the examination involved:

   a. Dons protective leaded rubber garments such as apron and gloves.
   b. Makes sure that no one is in examination room or control room.
   c. Performer reviews the technique chart(s) for the unit(s) to be used:

      - i) Locates information for the chest views involved. Takes note of the exposure factors to be used for overheads, fluoroscopy, and spot filming. Considers preferences of the radiologist involved.
      - ii) Notes any newly posted changes in technical factors (to reflect accommodation to a change in machine output or a policy decision).
      - iii) Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

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d. In the control room performer makes sure that indicator light shows that x-ray generator is "warmed up" and ready for use. Makes sure that all circuits have been stabilized. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.

e. As appropriate, performer sets x-ray generator mode selector(s) to fluoroscopic mode and for use of spot film camera or cassette device, and overhead filming.

f. Performer sets controls on image intensifier for spot film camera or cassette device:

   i) For spot film camera, performer selects and sets the rate (frames per second) for the camera according to standards set for examination.

   ii) For cassette spot filming performer may select and set a standard spot film program providing for format combinations such as single, half, or quarter combinations on a single cassette and related spot film sizes. Selects program appropriate for examination or awaits orders from radiologist.

g. If not already done, performer connects TV monitor to power outlet. Turns on monitor and checks that "ready" light is on.

h. If appropriate, performer selects the proper field size selector (if there is dual image intensifier).

i. Performer selects and sets exposure factors for fluoroscopy:

   i) Selects and sets the kVp at standard setting for the examination. May check indicator dial. With automatic density control, sets density selector as appropriate for examination.

   ii) If mA is automatically controlled according to patient thickness, performer turns fluoroscope mA selector to maximum standard position. If not automatically controlled, sets as appropriate for focal spot size and examination involved.

   iii) Sets fluoroscopic examination timer to maximum position.

j. If appropriate, performer selects and sets exposure factors for spot filming:

   i) For conventional manual exposure control, performer selects and sets the appropriate spot film time for the examination.

   ii) For automatic, phototimed exposure control, performer selects a density exposure control appropriate for the examination.

   iii) Performer selects the appropriate mA for the examination and the focal spot size to be used.

   iv) Performer selects and sets kVp by combining settings on one major and one minor kVp selector as appropriate for the examination.

4. Performer returns to examination room to set up x-ray and fluoroscope tube(s), image intensifier,

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collimator and accessories, as appropriate, for check of equipment prior to examination:

a. Makes sure that no one is in room.
b. Places phantom or appropriate test object on radiography table where patient's area of interest will be centered for examination.
c. Adjusts fluoroscopic tube stand (above or below table) so that tube is at zero degrees and centered to the area of interest.
d. If not already done, moves image intensifier and any spotfilm device into position; centers (over or under) the area of interest.
e. Performer adjusts the x-ray tube to appropriate focal spot/object distance (target to skin distance, TOD). For fluoroscopy adjusts distance between focal spot and image intensifier (focal spot to film distance, FFD). Makes sure that TOD is 15 inches or more. Operates controls or manually moves the x-ray tube(s) into place. Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD is obtained.
f. Performer collimates fluoroscopy tube (and x-ray tube used for spotfilming if different), depending on nature of the equipment and controls:

    i) Adjusts fluoroscopy beam shutters to the field size anticipated for fluoroscopic examination or sets shutter mode selector to automatic collimation.
    ii) Manually sets collimator for the spotfilm field size to be used, or selects and sets field size control to be used for automatic collimation with

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programmed spot film cassette exposure sequence.

g. If appropriate, performer attaches or sets up footboard at end of tilt-table; may adjust or attach shoulder rest, hand grips.

5. If not already done, performer checks functioning of fluoroscopy equipment by entering remote control room or operating controls in examination room behind leaded screen:

    a. To check fluoroscopy mode, performer turns on TV power switch controls as appropriate. Activates fluoroscope exposure by pressing footswitch or as appropriate. Views test object being fluoroscoped on TV monitor.

        i) Performer adjusts kVp control (and mA control if appropriate) and observes effects on TV monitor to be sure that equipment is operating properly.
        ii) Checks mA meter and notes whether appropriate reading is obtained.
        iii) Performer checks that TV brightness controls are operating and adjusts for preliminary viewing.
        iv) Checks examination timer by noting whether time elapse indicator moves during exposure showing decreasing time left for examination. May check that exposure is terminated when maximum examination exposure time is reached.

    b. To check spot film functioning, performer may move cassette or roll film into x-ray exposure field using appropriate controls:

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- i) Performer activates controls for spot film exposure. Notes whether cassette or roll film transport is operating appropriately. Notes whether exposure is terminated by phototimer or, if manual timer, in time set. If appropriate, releases spot film control after exposure.
- ii) If equipment is operating appropriately, performer unloads cassette and reloads or advances roll film as appropriate. Moves bucky out of way until fluoroscopy is completed.

c. After equipment has been checked performer shuts and resets for standard exposure factors. If performer decides that any of the fluoroscopic equipment is not functioning properly, performer informs appropriate staff member.

6. When fluoroscopic equipment has been set up, performer may note whether preliminary radiographs (scout films) have already been made of the patient (done by another radiologic technologist if work is organized in this way at institution).

   a. If scout films have already been made and viewed by radiologist, performer notes the technique used or ordered and sets up technical factors for any later overhead radiography such as for lung biopsy.
   b. If scout films have been made but not approved, performer places processed scout films and any prior films with patient's chart or places on view boxes for viewing by radiologist.

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   c. If scout films have not been made and are required before patient is seen by radiologist, performer arranges to take "plain films" of the chest in standard positions, depending on orders, for unilateral or bilateral studies in erect or recumbent positions, after readying patient.

7. Performer readies patient for examination by radiologist:

   a. Performer washes hands as appropriate. Depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
   b. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.
   c. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.
   d. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.
   e. Performer has patient assume a comfortable recumbent or seated position, as appropriate.

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i) If appropriate, places mattress, pillow or clean linen on x-ray table.

ii) If patient is in wheelchair, may move patient in chair into position next to table. Makes sure that wheelchair is in locked position.

iii) Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way that may be collided with by patient.

iv) If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.

v) If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move or have patient moved to table.

vi) Has patient rest in as relaxed a position as possible. May place pad, blanket or pillow under bony prominences to provide comfort for recumbent patient.

f. If not already done, has patient's clothing removed to the waist and provides gown or drape. May assist patient or request assistance from nurse if there is an injury involved. For bronchoscopy makes sure that patient removes any dentures. Permits patient to keep covered with gown until measurements are taken and until examination. Treats young patient with as much courtesy as adult.

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g. If patient has adhesive strapping in place, performer notes whether it is old and wrinkled and requires removal before fluoroscopy. If so, performer indicates this to appropriate staff member and waits for removal and restrapping by RN or MD.

h. If patient is to be radiographed in erect position, performer adjusts vertical film holder to appropriate height for patient.

8. If not already done, performer explains to patient what will be involved in the procedure:

a. Indicates what types of positions the patient will be asked to assume and the cooperation that will be asked for.

b. If not already done, checks that prior preparation such as abstinence from food, administration of medication, and/or postural drainage have been carried out.

c. Performer may make sure that an out-patient has made arrangements to be escorted home and to postpone normal activities for the rest of the day.

d. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer plans to inform radiologist and to proceed only with approval.

e. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's

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behavior. Remains aware that patient may be frightened and/or in pain. Performer explains, when asked medical questions, that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

f. Unless measurements have already been made, performer uses centimeter calipers to measure the thickness of the chest in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in determining exposure factors for overheads. After measuring, has patient rest in as relaxed a position as possible.

g. Performer may tape R or L marker to patient if appropriate for use in spot filming.

h. If appropriate before radiologist's examination, performer arranges to take "plain film" scouts and have them processed at once.

9. Performer informs attending radiologist when patient is ready to be examined. Brings requisition sheet, patient's medical history, chart, scout films (if already done) and any prior films to radiologist. Displays radiographs on view boxes.

   a. If not already done, performer tells radiologist about any difficulties encountered with regard to information, possible contraindications, or anything else that should be brought to radiologist's attention. Notes any special orders or change in procedure decided by radiologist. Proceeds as ordered.

   b. Performer may accompany radiologist to examination room and introduce patient to radiologist.

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10. During and/or after radiologist's review of scout films and examination of patient, performer makes note of radiologist's decisions and orders and proceeds as appropriate.

    a. If radiologist decides to cancel procedure, performer arranges to terminate and reschedule as appropriate.

    b. For lung biopsy notes orders for change in technical factors and/or patient positioning. Notes decisions on aspiration or tissue biopsy, on sizes of instruments, types of laboratory tests, and type of anesthetic to be used.

    c. For bronchoscopy notes orders on use of nasopharyngeal airway, anesthetic, types of laboratory tests and samples to be taken.

    d. Performer arranges to provide any equipment or materials not already present or decides to do personally. Adjusts technical factors and program for fluoroscopy and spot filming as ordered.

    e. For overheads with lung biopsy performer notes needed adjustment of technical factors from those used for scout film(s) to allow for any changes requested by radiologist in technique or positions.

    f. Sets or resets technical exposure factors as appropriate for overheads while radiologist continues with patient:

       i) Enters control room and sets controls for appropriate mode.

       ii) For conventional exposure control, performer selects milliamperage and chooses selectors for the correct focal spot size. Selects and sets the exposure time that will produce the mAs desired. Sets the kVp selected by choosing the combination of

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major kilovoltage and minor kilovoltage settings to produce the desired kVp.

iii) For automatic phototimed exposure control, performer selects and sets the category corresponding to the type of study and use or nonuse of screens, bucky, etc., and, if appropriate, focal spot size. Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).
May select and set a kVp range button (if called for with equipment) corresponding to range for examination.
Sets a density selector corresponding to the usual (or special) requirements of the study. Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.

iv) Depending on the equipment, may set controls to provide for use of automatic chest x-ray equipment, bucky, manual adjustment of table and tube height, position, and of collimation, unless these have already been set.

g. Performer discusses sequence and timing for procedure with radiologist. May arrange signals for exposure, changing of spot film cassettes, operation of exposure controls.

11. Performer may assist with further preparation for procedure:

a. May help position patient as appropriate.
b. Performer gives leaded gloves and apron to radiologist. If appropriate, places leaded curtain in

List Elements Fully

place. Provides patient and everyone remaining in room with appropriate protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.
c. Washes hands as appropriate, observing sterile technique.
d. If appropriate, performer opens packet of sterile gloves for radiologist, observing sterile technique so that wrapper, own hands, or other objects will not contaminate gloves.
e. With bronchoscopy, performer may assist with anesthetizing of patient's throat by providing patient with emesis basin and pad (for patient to hold tongue out of mouth).

12. Performer assists radiologist during fluoroscopic viewing to determine site of lesion or to check position of bronchoscope as ordered:

a. On signal from radiologist, performer may dim room lights. Turns on TV power switch. May go to control room and operate fluoroscope controls on orders from radiologist. Adjusts kVp and/or mA controls according to radiologist's orders.
b. Performer may operate tilt table on orders from radiologist, or assist in positioning patient as ordered.

13. Performer may assist in sterile surgical techniques for lung biopsy as appropriate by handing materials asked for.

Assists with fluoroscopy to check placement of needle or bronchoscope as described in step 12, above.

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14. During lung biopsy and throughout bronchoscopic examination, performer assists with spot filming:

    a. Operates exposure controls as ordered or positions table, tube, or patient as ordered.
    b. If spot film attachment uses cassettes, performer may unload as used, identify, and insert additional cassettes, as described above, throughout procedure.
    c. Depending on institutional procedures, performer may keep radiologist informed of cumulative exposure as shown on fluoroscope timer indicator.
    d. Performer may record location of lesion, assist with labeling of samples and/or record and identify photographs taken (with bronchoscope camera) as ordered.
    e. Performer arranges to have spot films processed as they are taken or as ordered.

        i) With cassette spot films removes any markers for further use. Attaches ID card for use with flasher if appropriate.
        ii) With spot film camera, performer advances the film so that all exposures made will be wound on the take-up spool in the roll film cassette. Uses device to cut film and create a light shield. Resets counter and removes film cassette.
        iii) Performer brings the processed spot films directly to the radiologist or places on view boxes and informs radiologist that they are ready. May hang prior films and scouts.
        iv) Changes technical factors as ordered and assists with any continued fluoroscopy and spot filming as described until radiologist indicates fluoroscopic examination is completed.

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15. With lung biopsy performer carries out overhead radiography as and when ordered by radiologist:

    a. Performer may position patient as appropriate for chest films to check any pneumothorax or as ordered. Performer may assist radiologist in positioning.
    b. Performer proceeds with overhead filming using technical factors decided as for scout ("plain") films of chest.
    c. Performer rehearses patient in the type of breathing required for the exposure(s), such as breathing in deeply and holding.
    d. Places identification marker on cassette, and right or left marker on cassette or table top as appropriate to the study and projection. Places cassette in position on table or in bucky as appropriate.
    e. Performer sets the focal-film distance, if not already done, as appropriate. Checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size. Uses cross-hair shadows as reference for center of field. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired.
    f. Once the patient has been positioned and immobilized, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the

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area of interest (and thus provide maximum protection and detail). Adjusts primary beam to minimum size needed to cover the part(s) of interest.

g. Rechecks that patient has been properly shielded.

h. Throughout procedure performer remains alert for any emergency symptom. If performer judges that patient's reaction may be severe, ceases exposure and notifies radiologist or attending physician at once.

i. When everything is ready for the exposure, performer reminds patient of the breath control to be used for exposure. Observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

j. Performer returns to control room. Makes sure controls are properly set, that equipment is set for radiography mode, and that patient is still in position. Tells patient when to breathe and hold as rehearsed by calling or using intercom. Initiates exposure by pressing hand trigger or exposure control button.

   i) While exposure is underway, performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
   ii) May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.
   iii) With phototimer notes whether backup timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure.
   iv) After exposure is completed tells patient that he or she can relax.
   v) If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.
   vi) After exposure removes cassette and removes markers for further use.
   vii) Repeats radiography for all the exposures ordered by radiologist, adjusting technical factors, tube, and position of patient or film holder as appropriate to each view ordered. Repeats identification, collimation, shielding and exposure as above.

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k. After overhead filming is completed, performer arranges to have overhead chest radiographs processed:

   i) May sign or have radiologist sign requisition sheet.
   ii) Removes any markers for further use. Attaches ID card for use with flasher if appropriate.
   iii) While films are being processed, makes sure that patient is comfortable and, if necessary, attended by radiologist, staff member, or self.

l. Performer brings the processed radiograph(s) directly to the radiologist in charge or places on view box(es) and informs radiologist that they are ready. May hang prior films, spots and scouts.

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- i) Performer notes any order for repeat of any part of radiographic examination.
- ii) Repeats appropriate steps as described above until radiologist indicates that examination can be terminated.
- iii) Notes any orders for delayed films.

16. With bronchoscopy performer notes radiologist's decision on whether to proceed at once to bronchography, or to order delayed bronchography.

    a. If bronchography is not to follow at once, performer may assist in removal of bronchoscope. Performer provides emesis basin and helps or encourages patient to cough gently and/or spit up into basin. Provides patient with towels or tissues.
    b. May disassemble bronchoscope and arrange to have sterilized and stored.
    c. If appropriate,performer reinforces instructions to patient not to eat or drink for an appropriate number of hours because the anesthetized pharynx and larynx could allow material to be aspirated into the tracheobronchial tree. With outpatient may write out instructions or present printed sheet of instructions to patient. Performer may reinforce explanation of what residual effects may be experienced. Reassures patient.

17. Performer carries out termination steps as appropriate:

    a. Performer may have patient cleansed. Removes any markers from patient's body.
    b. Performer may have patient transported to room, recovery area,or to appropriate location (such as for bronchography), or decides to do personally, as appropriate. If appropriate, makes sure that patient is in the care of a staff person who will transport to appropriate next location or, if out-patient, will arrange to discharge or send patient home with escort,as appropriate.
    c. Performer may have room and equipment cleaned; has any other appropriate clean up procedures followed to avoid infection or contamination, or decides to do personally, depending on institutional arrangements.
    d. May present requisition form to radiologist for comments and signature. May have radiologist fill out requisition sheet for delayed films or bronchography. May arrange for scheduling.
    e. May check that all samples have been prepared for laboratory, are properly identified,or decides to do personally. May present lab. order forms to radiologist for signature.
    f. Performer records the examination according to institutional procedures. May include date, room, examination type, any overhead views taken, the technical factors used, and film sizes. Performer may record the number of exposures made of each overhead view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. Signs requisition sheet.
    g. Performer may record the fluoroscopy examination including exposure time and rad dosage.

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h. Performer may decide to jacket radiographs, requisition sheets, and related materials, and/or have information recorded in log book personally, or have this done, depending on institutional procedures. i. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

TASK DESCRIPTION SHEET

Task Code No. 380

This is page 1 of 12 for this task.

1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Requisition reviewed;films identified;technical factors selected and set for fluoroscopy,spot filming, cineradiography;radiologist assisted with instillation,positioning, fluoroscopy;spot films sent for processing,taken to radiologist;procedures repeated as ordered;pt. returned;examination recorded;spot films placed for use.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, medical-technical history,prior radiographs;view boxes;pen;x-ray generator,control panels,tilt-table; fluoroscopy unit,cine camera,film;tube,image intensifier;grid;bucky,spot film device;roll film or cassettes;TV monitor;collimator;R-L,ID markers;procedure tray;emergency cart;contrast medium,heater; emesis basin,pad,towels;straw,water in cup;instruction sheet;leaded shielding,aprons,gloves;immobilization devices;cephalostat;technique,standard view, tube rating and rad exposure charts;phantom or test object;stretcher or wheelchair

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Any pt. to have cleft palate study;non-pediatric pt. to have laryngography;accompanying adult;radiologist; co-worker;nurse

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Providing technical assistance for laryngography or cleft palate study of any patient (or any similar fluoroscopic examination including spot filming and/or cineradiography) by reviewing request, preparing equipment and patient;setting factors for fluoroscopy,spot filming,cineradiography;identifying films; providing shielding;assisting with positioning of pt.,tube,table;arranging for processing;having patient returned;recording examination.

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Performer receives or obtains the x-ray requisition form, patient identification card, and any appropriate medical-technical history for a patient scheduled for a fluoroscopic examination not requiring overhead views such as laryngography (radioscopic examination of the larynx after instillation of iodized oil contrast medium) or a cleft palate study (radioscopic study of the structures involved in speech) as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.
d. From co-worker.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided:

   a. Performer checks the examination called for including whether contrast medium will be involved and the purpose of the study. Notes the name of the radiologist in charge; may note the name of the referring clinician.
   b. Performer reads patient's name, identification number, sex and age. Notes whether patient is in-patient, out-patient, or

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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emergency patient. Notes any special information or note on known pathology that could affect patient positioning, technique, or handling of the patient. For contrast study such as laryngography notes whether there is history of allergies. Notes whether patient will be on a stretcher or in a wheelchair.

c. Depending on the examination ordered performer notes whether fluoroscopy will be combined with spot filming, and/or cineradiography, and whether grid will be used, shielding needed.

d. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; notes whether patient will be accompanied by nurse, other staff person or member of family.

e. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete.

   i) Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether there is history of extensive radiography to bring to radiologist's notice.
   ii) Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.
   iii) Depending on institutional procedures, performer notes whether female patient of child-bearing age is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.
   iv) For laryngography, notes orders for prior abstinence from food and drink, prior administration of medication and/or sedation. May check whether these have been carried out; performer may check timing to be sure a proper elapse of time has occurred for medication or sedation to take effect.

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f. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly continue with preparations, or if performer considers that there may be contraindications to going ahead with the procedure, performer brings this to attention of radiologist in charge. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

g. If referring physician has requested that films already on file be presented with current radiographs, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

. Performer goes to appropriate room for the type of examination involved and the equipment required, or notes room assigned on requisition sheet. Prepares ahead so as not to keep patient in examination room longer than necessary:

a. Washes hands as appropriate.

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b. Checks that procedure tray has been prepared for the study involved or decides to do personally. For contrast study checks that emergency cart is present.

c. Checks that proper accessories are available for procedure including leaded rubber shielding, aprons, and gloves to be used by performer, radiologist, the patient, and/or anyone who will remain in the room during exposure.

d. Performer checks that appropriate immobilization devices are present. For cleft palate may obtain cephalostat for positioning skull in true lateral position. Checks that there is a mattress, pads, pillows and/or blankets for comfort of patient if patient will lie on table. Makes sure that right (R) and left (L) markers are available for use, and identification cards or leaded numerals or markers.

e. If examination will include spot filming using a camera (attached to image intensifier) and roll film, performer checks film supply indicator to make sure that there is sufficient film in the roll film cassette.

  i) If there is insufficient roll film in camera, performer arranges to have roll film cassette loaded, or decides to do personally.
  ii) When loaded roll film cassette is obtained, performer checks loading in subdued light. Checks that end of film is cut correctly and is properly threaded and attached to take-up spool so that film unwinds appropriately. Checks that film is properly engaged in sprockets. Locks into operating position.

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  If appropriate, cuts off excess film at exit port and removes. Attaches film cassette to camera and locks into place. Replaces camera cover.
  iii) If there is an adequate film supply, checks that film is properly loaded.
  iv) Performer advances film to compensate for any exposure of film due to installation or check.
  v) Removes dark slide from camera lens.
  vi) If not already done, performer writes or types a card with patient's identification information for use with spotfilm device. Inserts in slot in spotfilm camera as appropriate.

f. If examination will include spotfilming using a cassette/bucky spotfilm device, performer checks that there is an adequate supply of appropriate size cassettes in room.

  i) If there is insufficient supply of cassettes, arranges to obtain or decides to obtain personally.
  ii) Performer prepares for identification of the spotfilm cassettes. Depending on institutional procedures, performer may prepare for use of flash card by checking that there is piece of lead on cassette surface; may write or type out ID information on card if not received with requisition. Sets flash card aside for later use with space created by piece of leaded rubber on appropriate edge of cassette(s). May place card into

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card tray for equipment using automatic film marking device.

- iii) Performer may use controls or manually pull out spotfilm bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position.
- iv) If R-L markers are to be used with spotfilming, performer tapes into place on image intensifier screen or plans to tape to patient's body.

g. If examination will include use of cineradiography camera (attached to image intensifier), performer checks the amount of unexposed film remaining in the cine camera film magazine.

- i) If appropriate, performer arranges to have film magazine loaded with film or decides to do personally (in darkroom).
- ii) If performer has obtained newly loaded film magazine, attaches to camera by aligning and engaging film drive couplings. Slides in magazine until engaged; locks into position. Adjusts film and checks operation of film transport. Closes camera door and locks.
- iii) Performer advances film as appropriate onto the take-up spool.
- iv) If not already done, performer prepares card for identification of the cine film. Writes out or types appropriate patient identification information. Inserts identification card in cine camera in appropriate slot so that each frame

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will bear the ID information, or uses other identifier as appropriate to equipment.

h. If a grid will be used with the image intensifier for fluoroscopy and/or spot filming, performer positions and centers grid if not already done. May use control button or slides grid into position. May check that the grid is oriented toward the x-ray tube, with grid lines parallel to the long axis of the tube.

3. Performer reviews technical exposure factors for fluoroscopy, spot filming, and/or cineradiography based on standards set by the institution as appropriate for the examination involved:

a. Dons protective leaded rubber garments such as apron and gloves.
b. Makes sure that no one is in examination room or control room.
c. Performer reviews the technique chart(s) for the unit(s) to be used:

- i) Locates information for the examination involved. Takes note of the exposure factors to be used for fluoroscopy, spot filming, and/or cineradiography. Considers preferences of the radiologist involved.
- ii) Notes any newly posted changes in technical factors (to reflect accommodation to a change in machine output or a policy decision).
- iii) Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating

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chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

d. In the control room, performer makes sure that indicator light shows that x-ray generator is "warmed up" and ready for use. Makes sure that all circuits have been stabilized. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.

e. As appropriate, performer sets x-ray generator mode selector(s) for fluoroscopic mode and for use of spot film camera or cassette device, and/or cineradiography.

f. Performer sets controls on image intensifier for spot film camera or cassette device:

  i) For spot film camera, performer selects and sets the rate (frames per second) for the camera according to standards set for examination.
  ii) For cassette spot filming, performer may select and set a standard spot film program providing for format combinations such as single, half, or quarter combinations on a single cassette and related spot film sizes. Selects program appropriate for examination or awaits orders from radiologist.
  iii) For cineradiography, performer selects and sets the frame rate appropriate to the examination involved. May select an appropriate frame per second range

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and then make a finer adjustment within the range.

g. If not already done, performer connects TV monitor to power outlet. Turns on monitor and checks that "ready" light is on.

h. If appropriate, performer selects the proper field size selector (if there is dual image intensifier).

i. Performer selects and sets exposure factors for fluoroscopy:

  i) Selects and sets the kVp at standard setting for the examination. May check indicator dial. With automatic density control, sets density selector as appropriate for examination.
  ii) If mA is automatically controlled according to patient thickness, performer turns fluoroscope mA selector to maximum standard position. If not automatically controlled, sets as appropriate for focal spot size and examination involved.
  iii) Sets fluoroscopic examination timer to maximum position.

j. If appropriate, performer selects and sets exposure factors for spot filming:

  i) For conventional manual exposure control, performer selects and sets the appropriate spot film time for the examination.
  ii) For automatic, phototimed exposure control, performer selects a density exposure control appropriate for the examination.

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iii) Performer selects the appropriate mA for the examination and the focal spot size to be used.

iv) Performer selects and sets kVp by combining settings on one major and one minor kVp selector as appropriate for the examination.

k. If appropriate, performer selects and sets exposure factors for cine filming:

i) If standard procedure calls for constant exposure timing per frame, performer selects and sets appropriate time in milliseconds.

ii) If standard procedure calls for constant average density, performer selects the appropriate density control setting as appropriate to examination.

iii) Performer selects and sets a combination of one major and one minor kVp setting to obtain appropriate kVp for examination.

iv) Performer sets appropriate mA for the examination and focal spot size to be used.

4. Performer returns to examination room to set up x-ray and fluoroscope tube(s), image intensifier, collimator and accessories as appropriate for check of equipment prior to examination:

a. Makes sure that no one is in room.

b. Places phantom or appropriate test object on radiography table where patient's area of interest will be centered for examination.

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c. Adjusts fluoroscopic tube stand (above or below table) so that tube is at zero degrees and centered to the area of interest.

d. If not already done, moves image intensifier and any spotfilm device into position; centers (over or under) the area of interest.

e. Performer adjusts distance between focal spot and image intensifier (focal spot to film distance, FFD). Makes sure that TOD is 15 inches or more for fluoroscopy. Operates controls or manually moves the x-ray tube(s) into place. Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD is obtained.

f. Performer collimates fluoroscopy tube (and x-ray tube used for spotfilming if different), depending on nature of the equipment and controls:

i) Adjusts fluoroscopy beam shutters to the field size anticipated for fluoroscopic examination or sets shutter mode selector to automatic collimation.

ii) Manually sets collimator for the spotfilm field size to be used, or selects and sets field size control to be used for automatic collimation with programmed spotfilm cassette exposure sequence.

g. If appropriate, performer attaches or sets up footboard at end of tilt-table; may adjust or attach shoulder rest, hand grips, cephalostat.

TASK DESCRIPTION SHEET (continued)

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List Elements Fully

5. If not already done, performer checks functioning of equipment by entering remote control room or operating controls in examination room behind leaded screen:

   a. To check fluoroscopy mode, performer turns on TV power switch controls as appropriate. Activates fluoroscope exposure by pressing footswitch or as appropriate. Views test object being fluoroscoped on TV monitor.

      i) Performer adjusts kVp control (and mA control if appropriate) and observes effects on TV monitor to be sure that equipment is operating properly.
      ii) Checks mA meter and notes whether appropriate reading is obtained.
      iii) Performer checks that TV brightness controls are operating and adjusts for preliminary viewing.
      iv) Checks examination timer by noting whether time elapse indicator moves during exposure showing decreasing time left for examination. May check that exposure is terminated when maximum examination exposure time is reached.

   b. To check spot film functioning, performer may move cassette or roll film into x-ray exposure field using appropriate controls.

      i) Performer activates controls for spot film exposure. Notes whether cassette or roll film transport is operating appropriately. Notes whether exposure is terminated by phototimer or, if manual timer, in time set. If appropriate, releases spot film control after exposure.

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      ii) If equipment is operating appropriately, performer unloads cassette and reloads or advances roll film as appropriate. Moves bucky out of way until fluoroscopy is completed.

   c. To check operation of cine equipment, performer may start anode rotation. Performer activates appropriate exposure switch for cine exposure and checks that film take-up is functioning appropriately. Shuts camera after testing and advances film as appropriate.
   d. After equipment has been checked performer shuts and resets for selected exposure factors. If performer decides that any of the fluoroscopic equipment is not functioning properly, performer informs appropriate staff member. Arranges for alternate unit to be used.

6. Performer readies patient for examination by radiologist:

   a. Performer washes hands as appropriate. Depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
   b. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.
   c. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

TASK DESCRIPTION SHEET (continued)

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d. Performer greets patient and any accompanying staff person or family member and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

e. Performer has patient assume a comfortable recumbent or seated position, as appropriate.

   i) If appropriate, places mattress, pillow or clean linen on x-ray table.

   ii) If patient is in wheelchair may move patient in chair into position next to table. Makes sure that wheelchair is in locked position.

   iii) Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way that may be collided with by patient.

   iv) If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.

   v) If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move or have patient moved to table.

f. If not already done, has any jewelry or clothing removed from neck. May provide gown or drape. For laryngography makes sure that patient removes any dentures. Treats young patient with as much courtesy as adult.

g. If not already done, performer explains to patient what will be involved in the procedure:

   i) Indicates what types of positions the patient will be asked to assume and the cooperation that will be asked of the patient such as phonation.

   ii) For laryngography, may check that prior preparation on the part of patient such as abstinence from food has been carried out.
   If not already done, may question patient or accompanying adult about any allergies to shellfish or adverse reactions to contrast medium (especially iodine based). Checks whether an allergy test is required. Plans to notify radiologist if any sensitivity should be brought to his or her attention. Performer may explain to patient what side effects may be felt from contrast medium such as feeling of nausea, flushing, choking sensation.

   iii) If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer plans to inform radiologist and to proceed only with approval.

   iv) Performer answers patient's non-medical questions honestly; attempts to reassure patient

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and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains, when asked medical questions, that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

h. Performer may tape R or L marker to patient if appropriate for use in spot filming.

7. Performer informs attending radiologist when patient is ready to be examined. Brings requisition sheet, patient's medical history, chart, and any prior films to radiologist. Displays radiographs on view boxes.

   a. If not already done, performer tells radiologist about any difficulties encountered with regard to information, possible contraindications, or anything else that should be brought to radiologist's attention. Notes any special orders or change in procedure decided by radiologist. Proceeds as ordered.
   b. Performer may accompany radiologist to examination room and introduce patient to radiologist.

8. During and/or after radiologist's review of prior films and examination of patient, performer makes note of radiologists' decisions and orders such as choice of contrast medium for laryngography (based on whether there is allergy), change in standard technical factors, and/or final orders on program for spot filming and/or cineradiography.

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a. If radiologist decides to cancel procedure, performer arranges to terminate and reschedule as appropriate.
b. Performer discusses sequence and timing for procedure with radiologist. May arrange signals for exposure, changing of spot film cassettes, operation of exposure controls. Discusses how patient will be assisted or held.
c. Performer arranges to provide or change any equipment or supplies as ordered by radiologist.
d. For laryngography or similar contrast study, performer may help prepare syringes. Shakes and places in appropriate heating device and checks that contrast medium is maintained at appropriate body temperature until ready for use.
e. Changes or adjusts technical factors and settings as appropriate for fluoroscopy, spot filming and/or cineradiography.
f. Performer makes note of radiologist's instructions to patient for phonation of standard maneuvers for laryngography or test pattern for cleft palate study. If so ordered, performer may provide water to swallow, or a straw to blow through, or other object needed for cleft palate study.
g. Performer gives leaded gloves and apron to radiologist. If appropriate, places leaded curtain in place. Provides patient and anyone to remain in room during exposure with appropriate protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

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9. Performer assists with preliminary adjustment of fluoroscopic factors:

   a. Performer may assist in positioning of patient; may operate tilt-table as ordered.
   b. On signal from radiologist, performer may dim room lights. Turns on TV power switch. May go to control room and operate fluoroscope and spot film controls on orders from radiologist. Adjusts kVp and/or mA controls according to radiologist's orders.
   c. If preliminary spot films are to be made (as in laryngography) and if spot film attachment uses cassettes, performer may unload as used, identify, and insert additional cassettes, as described above.
      Performer prepares to process spot films at once:

      i) With cassette spot films, removes any markers for further use. Attaches ID card for use with flasher if appropriate.
      ii) With spot film camera, performer advances the film so that all exposures made will be wound on the take-up spool in the roll film cassette. Uses device to cut film and create a light shield. Resets counter and removes film cassette.
      iii) Arranges to have spot films processed at once or decides to process personally.
      iv) When the spot films have been processed and returned, performer places on view boxes. May also hang prior films. Informs radiologist that radiograph(s) are ready.

   d. Performer notes any orders for changes in the technical factors and adjusts as ordered.

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   e. For laryngography, performer may assist with preparation of patient:

      i) Washes hands as appropriate.
      ii) May help position patient.
      iii) May open packet of gloves for radiologist and assist with mask and gown.
      iv) May assist with anesthetization of patient's throat by providing patient with emesis basin and pad (for patient to hold tongue out of mouth).

10. Performer assists radiologist during fluoroscopic examination:

   a. On signal from radiologist, performer may dim room lights. Turns on TV power switch. May go to control room and operate fluoroscope, spot film, cine controls on orders from radiologist. Adjusts kVp and/or mA controls according to radiologist's orders.
   b. Performer may operate tilt table on orders from radiologist, or assist in positioning patient as ordered.
   c. For cleft palate performer may provide patient with straw to blow through or water to swallow as ordered. May assist patient or reinforce phonation instructions. Reassures patient.
   d. For laryngography with cassette spot film attachment, performer may unload cassettes as used, identify, and insert additional cassettes, as described above, throughout procedure.
   e. Depending on institutional procedures, performer may keep radiologist informed of cumulative exposure as shown on fluoroscope timer indicator.

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11. From time to time on orders, or when radiologist indicates that fluoroscopic examination is completed, performer arranges to process spot films and/or cine film:

    a. May sign or have radiologist sign requisition sheet.
    b. Checks that equipment is turned off.
    c. With cassette spot films removes any markers for further use. Attaches ID card for use with flasher if appropriate.
    d. With spot film camera, performer advances the film so that all exposures made will be wound on the take-up spool in the roll film cassette. Replaces dark slide on camera lens. Uses device to cut film and create a light shield. Resets counter and removes film cassette. When spot filming is completed, removes any markers from patient's body.
    e. With cineradiography, performer checks that cine camera is turned off and that the film transport mechanism has come to a complete stop. Unlocks and removes film magazine.
    f. Performer arranges to have spot films and/or cine film processed at once if appropriate or decides to process personally.

12. When the films have been processed and returned, performer places spot films on view boxes. May also hang any scout spots and prior films. May give processed cine film to radiologist and set up cine projector and screen. Informs radiologist that radiograph(s) are ready for viewing.

13. Performer notes any order for repeat of any part of fluoroscopic examination. Changes technical factors as ordered. Assists in continued examination as described above, repeating appropriate steps.

14. For laryngography performer may assist radiologist in follow-up procedures:

    a. Provides emesis basin and helps or encourages patient to cough gently and/or spit up contrast medium. Provides patient with towels or tissues.
    b. If appropriate,performer reinforces instructions to patient not to eat or drink for an appropriate number of hours because the anesthetized pharynx and larynx could allow material to be aspirated into the tracheobronchial tree. With out-patient may write out instructions or present printed sheet of instructions to patient. Performer may reinforce explanation of what residual effects may be experienced. Reassures patient.

15. After the radiography is completed, performer carries out termination steps:

    a. Performer may have patient cleansed. May have patient transported to recovery area, to room, or to next assigned location, or decides to do personally as appropriate. If appropriate, makes sure that patient is in the care of a staff person who will transport to appropriate next location or, if out-patient, will arrange to discharge or sent patient home with escort as appropriate.
    b. May decide to assist patient from table or to chair. Makes sure

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patient is reminded of any footrest in stepping off table. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table and assists patient. c. May have room and equipment cleaned; has any other appropriate clean up procedures followed to avoid infection or contamination, or decides to do personally, depending on institutional arrangements. d. Performer records the examination according to institutional procedures. May include date, room, examination type, the technical factors used. Performer may record the number of spot films made including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage). May record fluoroscopic exposure time and rad dosage; may record any problem with equipment, any special care provided patient. May sign requisition sheet. e. May present requisition form to radiologist for comments and signature. f. Performer may decide to jacket spot films, requisition sheets, and related materials, and/or have information recorded in log book personally, or have this done, depending on institutional procedures. g. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

TASK DESCRIPTION SHEET

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1. **What is the output of this task? (Be sure this is broad enough to be repeatable.)**

Requisition reviewed;pt. reassured;parts measured; films identified;technical factors selected and set for fluoroscopy,spot filming,cine,overheads;scouts taken;pt.assisted in swallowing contrast;radiologist assisted with positioning,fluoroscopy;overhead exposures made;radiographs sent for processing, taken to radiologist;procedures repeated as ordered; delayed series taken;pt. returned;examination recorded;radiographs placed for use.

2. **What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)**

Pt.'s x-ray requisition sheet,ID card,ID bracelet, medical-technical history,prior radiographs;scouts; view boxes;pen;x-ray generator,control panels,tube, bucky,table,collimator;fluoroscopy unit,image intensifier,spot film device,TV monitor;cassettes;roll film;cine camera,film;R-L,ID,timing markers;prepared barium colloidal suspension;barium pill;cup;straw; prepared straw,carbonated beverage or gas releasing powder;compression devices;pen;phone;extension cones; stool;calipers;upright holder;lead aprons,shielding; immobilization devices;technique,standard view,tube rating and rad exposure charts;forms;phantom or test object;stretcher or wheelchair;intercom

3. **Is there a recipient, respondent or co-worker involved in the task?** Yes...(X) No...( )

4. **If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.**

Non-pediatric patient to have upper GI radiography; radiologist;co-workers

5. **Name the task so that the answers to questions 1-4 are reflected. Underline essential words.**

Taking upper GI radiographs of non-pediatric pt., by reviewing request;preparing equipment;preparing and reassuring pt.;measuring parts;setting up for fluoroscopy,spot filming and cine;arranging for scout films as ordered;setting technical factors;identifying films;providing shielding;assisting pt. to swallow barium sulfate contrast;assisting in positioning of pt.,fluoroscopy,spot filming;taking overhead radiographs as ordered;arranging for processing;taking delayed film series as ordered;having pt. returned; placing radiographs for use;recording.

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Performer receives or obtains the x-ray requisition form, patient identification card, and any appropriate medical-technical history for a non-pediatric patient scheduled for any upper gastrointestinal series (contrast study of esophagus, stomach, small intestine) involving ingestion of contrast by mouth as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.
d. From co-worker.
e. Having arranged,after receiving orders, to proceed with air contrast study of stomach of patient who has just undergone upper GI series.

Requisition may indicate orders for routine GI series and/or be focused on a particular area of interest.

Depending on institutional arrangements, performer may also receive scout film(s) and/or prior films already taken by co-worker with record of technical factors used and/or any changes necessary.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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the completeness of the information provided:

a. Performer checks the examination called for and the areas involved. Notes whether a routine GI series is ordered, a study of individual organs, such as esophagus, stomach, small intestines, whether a special study is ordered such as air contrast of stomach, hiatal or diaphragmatic hernia.

b. Notes the name of the radiologist in charge; may note the name of the referring clinician.
Notes the purpose of the study, and any special requests, shielding need. Notes whether erect and/or recumbent positioning is called for, any overhead views ordered, breathing and/or phonation instructions, whether compression devices will be required. Notes side of interest for lateral or oblique views. Notes any request for use of biplane equipment.

c. Performer reads patient's name, identification number, sex, age, weight, and height. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information or note on known pathology that could affect patient positioning, technique, or handling such as critical condition of patient. Notes whether patient will be on a stretcher or in a wheelchair. Notes whether the use of a grid or bucky will be involved.

d. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter, colostomy, T-tube or similar device in place; notes

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whether patient will be accompanied by nurse or other staff person, whether there are orders for removal of dressings from the abdominal area.

e. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete:

   i) Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether there is history of extensive radiography to bring to radiologist's attention.
   ii) Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.
   iii) Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.
   iv) Notes orders for prior preparation of patient such as abstinence from smoking, food, and drink, use of cleansing enemas. Notes whether these have been carried out.

f. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer con-

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siders that there may be contraindications to going ahead with the procedure, performer brings this to attention of radiologist in charge. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

g. If prior radiographs already on file are to be presented with scout films, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. Performer goes to appropriate room for the type of examination involved and the equipment required, or notes room assigned on requisition sheet. Prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Washes hands as appropriate.
   b. Checks that procedure tray has been prepared for the study involved or decides to do personally: Checks that the barium sulfate colloidal suspension has been prepared in the appropriate consistency(ies) for the study ordered, such as thin mixture, cream, and/or paste. Checks that barium pills, cups, straws, spoons, carbonated beverage, gas releasing powder and/or water are available if ordered or standard; or decides to prepare personally.
   c. Checks that emergency cart is present or available.
   d. Checks that proper accessories are available for procedure including leaded rubber shielding, aprons, and gloves to be used by performer, radiologist, the patient, and/or anyone who will remain in the room during exposure.

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   e. Checks that appropriate immobilization devices are present, and that there is a mattress, pads, pillows and/or blankets for comfort of patient if patient will lie on table. If appropriate, prepares balsa wood or foam rubber compression device or angle board with grid, cassette tray and padding (for use in study of hiatal hernia). May set up for biplane radiography for retrogastric soft tissue study.
   f. Makes sure that right (R) and left (L) markers are available for use and identification cards, or leaded numerals or markers.
   g. For overhead filming performer makes sure that an adequate supply of loaded cassettes and appropriate film holders are available in the examination room. Selects appropriate speed and type of film, grid and cassette combination depending on whether a bucky or table top technique will be used and standard institutional practices. Selects size based on patient's size and area of interest. If adequate supply is not in room, arranges to obtain or decides to obtain personally.
   h. Performer prepares for identification of overhead films using equipment provided by institution:

      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information and time elapse for serial exposures.
      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film

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holder surface; may write or type out ID information on card if not received with requisition.

iii) Checks identification against requisition sheet.

i. If examination will include spot filming using a camera (attached to image intensifier) and roll film, performer checks film supply indicator to make sure that there is sufficient film in the roll film cassette.

  i) If there is insufficient roll film in camera, performer arranges to have roll film cassette loaded, or decides to do personally.
  ii) When loaded roll film cassette is obtained, performer checks loading in subdued light. Checks that end of film is cut correctly and is properly threaded and attached to take-up spool so that film unwinds appropriately. Checks that film is properly engaged in sprockets. Locks into operating position. If appropriate, cuts off excess film at exit port and removes. Attaches film cassette to camera and locks into place. Replaces camera cover.
  iii) If there is an adequate film supply, checks that film is properly loaded.
  iv) Performer advances film to compensate for any exposure of film due to installation or check.
  v) Removes dark slide from camera lens.
  vi) If not already done, performer writes or types a card with patient's identification information, for use with spot film device. Inserts in slot in spot film camera as appropriate.

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j. If examination will include spot filming using a cassette/bucky spot film device, performer checks that there is an adequate supply of appropriate size cassettes in room.

  i) If there is insufficient supply of cassettes, arranges to obtain or decides to obtain personally.
  ii) Performer carries out identification of the spot film cassettes as for overhead films.
  iii) Performer may use controls or manually pull out spot film bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position.
  iv) If R-L markers are to be used with spot filming, performer tapes into place on image intensifier screen or plans to tape to patient's body.

k. If examination will include use of cineradiography camera (attached to image intensifier), performer checks the amount of unexposed film remaining in the cine camera film magazine.

  i) If appropriate, performer arranges to have film magazine loaded with film or decides to do personally (in darkroom).
  ii) If performer has obtained newly loaded film magazine, attaches to camera by aligning and en-

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gaging film drive couplings. Slides in magazine until engaged; locks into position. Adjusts film and checks operation of film transport. Closes camera door and locks.

iii) Performer advances film as appropriate onto the take-up spool.

iv) If not already done, may prepare card for identification of the cine film. May write out or type appropriate identification information. Inserts identification card in cine camera in appropriate slot so that each frame will bear the ID information, or places other ID marker as appropriate.

1. If a grid will be used with the image intensifier for fluoroscopy and/or spot filming, performer positions and centers grid if not already done. May use control button or slides grid into position. May check that the grid is oriented toward the x-ray tube, with grid lines parallel to the long axis of the tube.

3. Performer reviews technical exposure factors and sets for fluoroscopy, spot filming and cineradiography based on standards set by the institution as appropriate for the examination involved:

   a. Dons protective leaded rubber garments such as apron and gloves.
   b. Makes sure that no one is in examination room or control room.
   c. Performer reviews the technique chart(s) for the unit(s) to be used:

      i) Locates information for the projections involved. Takes note of the exposure factors

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to be used for overheads, fluoroscopy, and spot filming. Considers preferences of the radiologist involved.

ii) Notes any newly posted changes in technical factors (to reflect accommodation to a change in machine output or a policy decision).

iii) Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

d. In control room performer makes sure that indicator light shows that x-ray generator is "warmed up" and ready for use. Makes sure that all circuits have been stabilized. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.

e. As appropriate, performer sets x-ray generator mode selector(s) to fluoroscopic mode and for use of spot film camera or cassette device, cineradiography, and overhead filming.

f. Performer sets controls on image intensifier for spot film camera or cassette device:

   i) For spot film camera, performer selects and sets the rate (frames per second) for the camera according to standards set for examination.

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ii) For cassette spot filming performer may select and set a standard spot film program providing for format combinations such as single, half, or quarter combinations on a single cassette and related spot film sizes. Selects program appropriate for examination or awaits orders from radiologist.
iii) For cineradiography, performer selects and sets the frame rate appropriate to the examination involved. May select an appropriate frame per second range, and then make a finer adjustment within the range.

g. If not already done, performer connects TV monitor to power outlet. Turns on monitor and checks that "ready" light is on.
h. If appropriate, performer selects the proper field size selector (if there is dual image intensifier).
i. Performer selects and sets exposure factors for fluoroscopy:

i) Selects and sets the kVp at standard setting for the examination. May check indicator dial. With automatic density control, sets density selector as appropriate for examination.
ii) If mA is automatically controlled according to patient thickness, performer turns fluoroscope mA selector to maximum standard position. If not automatically controlled, sets as appropriate for focal spot size and examination involved.
iii) Sets fluoroscopic examination timer to maximum position.

j. If appropriate, performer selects and sets exposure factors for spot filming:

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i) For conventional manual exposure control, performer selects and sets the appropriate spot film time for the examination.
ii) For automatic, phototimed exposure control, performer selects a density exposure control appropriate for the examination.
iii) Performer selects the appropriate mA for the examination and the focal spot size to be used.
iv) Performer selects and sets kVp by combining settings on one major and one minor kVp selector as appropriate for the examination.

k. If appropriate, performer selects and sets exposure factors for cine filming:

i) If standard procedure calls for constant exposure timing per frame, performer selects and sets appropriate time in milliseconds.
ii) If standard procedure calls for constant average density, performer selects the appropriate density control setting as appropriate to examination.
iii) Performer selects and sets a combination of one major and one minor kVp setting to obtain appropriate kVp for examination.
iv) Performer sets appropriate mA for the examination and focal spot size to be used.

4. Performer returns to examination room to set up x-ray and fluoroscope tube(s), image intensifier, collimator and accessories, as appropriate for check of equipment prior to examination:

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a. Makes sure that no one is in room.
b. Places phantom or appropriate test object on radiography table where patient's area of interest will be centered for examination.
c. Adjusts fluoroscopic tube stand (above or below table) so that tube is at zero degrees and centered to the area of interest.
d. If not already done, moves image intensifier and any spot film device into position; centers (over or under) the area of interest.
e. Performer adjusts the x-ray tube(s) to appropriate focal spot-object distance (target to object distance, TOD). For fluoroscopy, adjusts distance between focal spot and image intensifier (focal spot to film distance, FFD). Makes sure that TOD is 15 inches or more. Operates controls or manually moves the x-ray tube(s) into place. Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD is obtained.
f. Performer collimates fluoroscopy tube (and x-ray tube used for spot filming if different), depending on nature of the equipment and controls:

   i) Adjusts fluoroscopy beam shutters to the field size anticipated for fluoroscopic examination or sets shutter mode selector to automatic collimation.
   ii) Manually sets collimator for the spot film field size to be used, or selects and sets field size control to be used for automatic collimation with programmed spot film cassette exposure sequence.

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g. If appropriate, performer attaches or sets up footboard at end of tilt-table; may adjust or attach shoulder rest, hand grips, compression band.

5. If not already done, performer checks functioning of fluoroscopy equipment by entering remote control room or operating controls in examination room behind leaded screen:

   a. To check fluoroscopy mode, performer turns on TV power switch controls as appropriate. Activates fluoroscope exposure by pressing footswitch or as appropriate. Views test object being fluoroscoped on TV monitor.

      i) Performer adjusts kVp control (and mA control if appropriate) and observes effects on TV monitor to be sure that equipment is operating properly.
      ii) Checks mA meter and notes whether appropriate reading is obtained.
      iii) Performer checks that TV brightness controls are operating and adjusts for preliminary viewing.
      iv) Checks examination timer by noting whether time elapse indicator moves during exposure showing decreasing time left for examination. May check that exposure is terminated when maximum examination exposure time is reached.

   b. To check spot film functioning, performer may move cassette or roll film into x-ray exposure field using appropriate controls.

      i) Performer activates controls for spot film exposure. Notes

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whether cassette or roll film transport is operating appropriately. Notes whether exposure is terminated by phototimer or, if manual timer, in time set. If appropriate, releases spot film control after exposure.

ii) If equipment is operating appropriately, performer unloads cassette and reloads or advances roll film as appropriate. Moves bucky out of way until fluoroscopy is completed.

c. To check operation of cine equipment, performer may start anode rotation. Performer activates appropriate exposure switch for cine exposure and checks that film take-up is functioning appropriately. Shuts camera after testing and advances film as appropriate.

d. After equipment has been checked, performer shuts and resets for standard exposure factors. If performer decides that any of the equipment is not functioning properly, performer informs appropriate staff member. Arranges for alternate unit to be used.

6. When fluoroscopy equipment has been set up, performer may note whether a preliminary scout film(s) has already been made of the patient (done by another radiologic technologist if work is organized in this way at institution).

   a. If a scout film has already been made and viewed by radiologist, performer notes the technique used or ordered and plans technical factors for overhead radiography, adjusting for use of contrast medium.

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   b. If a scout film has been made but not approved, performer places processed scout film and any prior films with patient's chart or places on view box for review by radiologist.

   c. If a scout film has not been made and is required before patient is seen by radiologist, performer arranges to take a "plain film" of the abdomen in standard AP position or as ordered. May arrange to take standard view of chest or anterior portion of neck for study of esophagus. Plans to proceed as for plain film radiography after readying patient.

7. Performer readies patient for examination by radiologist:

   a. Performer washes hands as appropriate. Depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.

   b. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

   c. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

   d. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer

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checks with accompanying staff member on any special precautions necessary during procedure.

e. If patient has just undergone a barium study of the upper gastrointestinal system, performer proceeds directly to preparations for air contrast examination of stomach.

f. Performer has patient assume a comfortable recumbent or seated position, as appropriate.

   i) If appropriate, places mattress, pillow or clean linen on x-ray table. May place pad, blanket or pillow under bony prominences to provide comfort for recumbent patient.
   ii) If patient is in wheelchair may move patient in chair into position next to table. Makes sure that wheelchair is in locked position.
   iii) Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way that may be collided with by patient.
   iv) If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.
   v) If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move or have patient moved to table.

g. If not already done, has patient's clothing removed (down to waist for study of esophagus) and provides gown or drape. May assist patient or request assistance from nurse if there is a critical illness involved. Permits patient to keep covered with gown until measurements are taken and until exposure. Treats young patient with as much courtesy as adult.

h. Performer evaluates the patient's bodily habitus to estimate the size, shape and position of the stomach and variations in location between erect and recumbent positions for later centering. Notes whether the areas of interest are heavily covered by muscle or soft fat, whether the palpation points will be easy to find. Notes whether the extremities are of unequal length. For female patients where esophagus is involved, performer judges whether the breasts are large and pendulous. If so, may plan to have patient or staff member draw the breasts to the sides and hold in place with wide bandage.

i. If patient has a wound, colostomy, ileostomy, or T-tube with dressing to be removed, performer checks whether zinc or iodoform paste or radiopaque gauze is being used. If so, has appropriate staff member remove dressing or tube or decides to do personally (if appropriate). Checks that radiopaque paste or gauze is completely removed.

j. If patient is to be radiographed in erect position, performer adjusts vertical film holder to appropriate height for patient and moves this out of the way until needed.

8. If not already done, performer explains to patient what will be involved in the procedure:

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a. Depending on the examination to be done, performer describes how the barium sulfate mixture will be administered orally, what cooperation will be requested of patient, and what the contrast mixture will taste like. Describes what the doctor will be doing and what later activities can be expected such as overhead filming, delayed serial filming, and the need to abstain from food during delayed film procedures. Indicates what types of positions the patient will be asked to assume. Describes any probable breathing control, phonation, use of compression devices, as appropriate. May demonstrate how tilt table will be used and reassure patient that he or she will be held safely.

b. If not already done, performer checks that orders for prior preparation for study of stomach and/or small intestines, such as diet, abstinence from food, drink, smoking (and perhaps medication) on day of examination have been carried out. May check whether orders for prior evacuation or emptying of bladder (or keeping bladder full) have been given and carried out; if not already done, may arrange to have micturition orders carried out. Plans to notify radiologist if any prior orders have not been carried out.

c. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer plans to inform radiologist and to proceed only with approval.

d. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains, when asked medical questions, that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

e. Unless measurements have already been made, performer uses centimeter calipers to measure the thickness of the chest and abdomen in the directions in which the central ray of the x-ray beam will pass through the centered part from tube to film. If both recumbent and erect positioning will be used for radiography of abdominal contents, performer measures or estimates thickness in both positions. Records for use in determining exposure factors for overheads. After measuring, has patient rest in as relaxed a position as possible.

f. Performer may tape R or L marker to patient if appropriate for use in spot filming.

g. If appropriate before radiologist's examination, performer arranges to take "plain film" scout(s) of abdomen and have processed at once, or decides to do personally. Uses AP supine position or follows orders or institutional procedures for scout film(s). For esophagus study makes scout of chest and/or anterior portion of neck.

9. Performer informs attending radiologist when patient is ready to be examined. Brings requisition sheet, patient's medical history, chart, scout films (if already done) and any prior films to radiologist. Displays radiographs on view boxes.

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a. If not already done, performer tells radiologist about any difficulties encountered with regard to information, possible contraindications, or anything else that should be brought to radiologist's attention. Notes any special orders or change in procedure decided by radiologist. Proceeds as ordered.

b. Performer may accompany radiologist to examination room and introduce patient to radiologist.

c. If not already done, performer awaits and carries out radiologist's orders for scout film(s) and proceeds as appropriate for views and positions ordered. Presents for review as described above.

10. During radiologist's review of requisition, scouts, prior films and examination of patient, performer notes radiologist's orders:

a. If radiologist decides to cancel procedure, performer may arrange to terminate and reschedule as appropriate, have forms filled out.

b. Performer notes whether radiologist requires a change in technical factors and/or patient positioning or centering for later overhead filming.

c. Notes radiologist's orders for program and settings for spot filming and/or cineradiography as appropriate.

d. Notes radiologist's final orders on sequence of examination and use of contrast including consistency of mixture(s).
For air contrast of stomach, notes whether a straw, carbonated beverage, or gas releasing powder will be used. For esophagus, notes whether a barium pill will be used.

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e. Discusses sequence and timing for procedure with radiologist. May arrange signals for exposure, changing of spot film cassettes, operation of exposure controls.

f. Performer arranges to provide or change any equipment or supplies as ordered by radiologist. Once contrast medium has been selected, performer restirs mixture and prepares to administer.

g. If required, changes or adjusts technical factors, program, and settings for fluoroscopy, spot filming, cineradiography.

11. Performer assists radiologist with fluoroscopic preparations:

a. Washes hands as appropriate.

b. Performer gives leaded gloves and apron to radiologist. If appropriate, places leaded curtain in place. Provides patient and everyone remaining in room during exposure with appropriate protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

12. If patient can assume erect position performer positions patient in front of vertical table. Performer stirs contrast mixture.

a. For study of esophagus, performer may feed a spoonful of thick mixture to patient and caution patient to hold in mouth. Turns patient's head to the left and has patient follow radiologist's orders. Performer stands by with cup containing mixture and spoon, or has patient hold these.

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b. For esophagus, stomach and small intestine, performer may give cup or glass of barium mixture to patient to hold in left hand resting against left shoulder, or performer may hold. Has patient await radiologists' orders on when to swallow.

c. For air contrast of stomach, performer gives straw to patient (with hole placed so that patient can suck in air) or a cup of carbonated beverage, or powder and water in cup to wash it down with. Instructs patient in how to suck in air, drink beverage or powder and water. Positions and prepares patient with barium mixture in cup as in b, above, unless radiologist has decided that prior contrast study has eliminated need for more barium.

13. Performer assists radiologist during fluoroscopic examination as ordered:

a. On signal from radiologist, performer may dim room lights. Turns on TV power switch. May go to control room and operate fluoroscope controls on orders from radiologist. Adjusts kVp and/or mA controls according to radiologist's orders.

b. Performer may hold cup while patient sips barium mixture or may feed thick mixture to patient with spoon as ordered throughout examination.

c. Performer may assist radiologist with spot filming:

i) Operates exposure controls as ordered, or positions table, tube, or patient as ordered.

ii) If spot film attachment uses cassettes, performer may unload as used, identify, and insert additional cassettes, as described above, throughout procedure.

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d. Performer may help radiologist to position patient in appropriate supine, prone, oblique and Trendelenburg positions. May operate tilt table on orders from radiologist.

e. For study of stomach, performer may position pressure cone on orders from radiologist.

f. If patient has swallowing difficulty, performer may, when ordered, provide patient with a barium pill and barium mixture to wash it down. Assists patient as needed.

g. Depending on institutional procedures, performer may keep radiologist informed of cumulative exposure as shown on fluoroscope timer indicator.

h. Performer notes any order for repeat of any part of fluoroscopic examination. Changes technical factors as ordered. Assists in continued examination as described above, repeating appropriate steps.

14. When the radiologist informs performer that the fluoroscopic portion of the examination is over, performer notes orders for immediate overhead filming and any delayed serial filming:

a. Notes whether additional contrast is to be administered by performer.

b. Notes whether standard series of overheads are required and/or special positions, views, time sequences, breathing instructions for exposures.

c. Notes any orders on delayed serial filming.

d. Notes particular areas of interest.

e. May note whether radiologist has marked patient's back at location

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of duodenal bulb or pylorus for centering purposes. If so, notes whether this was with patient in erect or prone position.

f. May discuss with radiologist any special precautions needed in patient positioning, to avoid injuring patient.

g. May have radiologist fill out and/ or sign requisition sheet.

15. Performer explains to patient what overhead radiography will be done and the positions that have been ordered and then quickly prepares for filming as follows:

a. Performer obtains the appropriate size loaded cassette for the first (or next) projection.

b. Performer attaches identification information to the cassette or table top:

i) Places right or left marker on film holder or table-top as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.

ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of cassette.

iii) If patient identification information is to be entered by use of flasher, sets flash card aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.

iv) Performer may place patient's card into card tray for equipment using automatic film marking device.

v) If exposure is part of a series places marker to indicate time elapse or the number of the exposure within the series.

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c. If cassette is to be used with bucky (under tabletop or in upright holder) performer may manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.

d. Performer may place cassette in upright holder at right angles to tabletop or in other position selected.

e. Performer sets or resets the exposure factors for the first (or next) projection:

i) Enters control room and sets control for radiography mode.

ii) Adjusts technical exposure factors to account for instructions from radiologist based on viewing of scout film(s), use of contrast material, and/ or measured change of thickness (of abdomen) between erect and recumbent positioning, extreme fat or muscularity.

iii) For conventional exposure control, performer selects milliamperage and sets selectors for the correct focal spot size. Selects and sets the exposure time that will produce the mAs desired. Sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

iv) For automatic phototimed exposure control, performer selects and sets the category corresponding to the type of

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study and use or nonuse of screens, bucky, etc., and, if appropriate, focal spot size. Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).
May select and set a kVp range button (if called for with equipment) corresponding to range for examination.
Sets a density selector corresponding to the usual (or special) requirements for the study. Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.

v) Depending on the equipment, may set controls to provide for use of bucky, manual adjustment of table and tube height, position, and of collimation, unless these have already been set.

16. Performer prepares patient for the final position ordered for the first (or next) exposure. Makes sure that correct side is being positioned when appropriate.

a. May explain or demonstrate to patient what is required. May obtain help in positioning.
b. If patient has a urinary catheter in place, performer turns patient toward the catheter and tubing to prevent separating it from drainage bottle and breaking sterile system and to avoid causing pain.
c. When positioning a patient with a balloon catheter in place, performer makes sure that the clamp is not lying over a part to be exposed or that patient is not lying on the clamp.
d. If patient will be standing and limbs are of unequal length, performer provides support to shorter limb so as to evenly distribute weight.
e. Performer centers part and keeps the long axis of the part parallel to the film holder. When using a bucky, centers patient to midline. With cassette on table top, centers film to part. With upright holder adjusts height of holder to part and centers part to film.
f. Performer positions patient in prone PA, supine AP, or erect positions by arranging body so that its median sagittal plane is centered to the midline of table or film holder.
For lateral positioning has median sagittal plane parallel with midline. If recumbent, supports any elevated parts.

i) With all positions arranges patient's shoulders so that they lie on a single transverse plane.
ii) Has prone patient flex elbows, place arms in a comfortable position. Supports ankles. Rests patient's head on forehead and nose. May have patient rest hands beneath chest.
iii) Has erect patient face film holder for PA projection; face away from film holder for AP projection.
iv) Has supine patient place arms in a comfortable position and supports ankles and knees.
v) For thin patient in recumbent lateral, PA and oblique positions, performer may elevate chest to place the cervical vertebrae at a correct level.

17. If performer is to take immediate overheads of the esophagus, performer notes the positions and views ordered, whether barium sulfate is

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to be administered, and the consistency to use. Performer has patient assume recumbent position unless otherwise ordered.

a. Performer rehearses patient in taking the barium sulfate through a drinking straw or being fed by performer with spoon, depending on its consistency. Depending on orders, performer may demonstrate how patient is to swallow several mouthfuls in rapid succession on orders, hold a mouthful, and swallow on orders just before exposure. Notes whether no additional contrast will be given.

b. Performer rehearses patient in breath control as ordered:

  i) May demonstrate how to exhale fully, swallow the mouthful of barium mixture, and hold breath until told to relax.
  ii) May demonstrate how to take a deep breath, hold breath, swallow mouthful of barium mixture and perform Valsalva maneuver. For the latter demonstrates and rehearses patient in bearing down as though evacuating while holding breath until told to relax.
  iii) May demonstrate how to swallow barium mouthful on moderate inhalation. Performer plans to make exposures during the few seconds following deglutition.
  iv) May demonstrate how to drink barium mixture through a tube in rapid continuous swallows.
  v) If a modified Valsalva or Muller maneuver is ordered, performer demonstrates and rehearses patient in inhaling deeply and slowly on orders, exhaling completely three or four times, pinching nostrils together with the thumb and forefinger

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of one hand, closing mouth, and making a sustained but mild effort to blow nose until told to relax; or pinch nostrils, close mouth, and blow cheecks outward as if blowing up a balloon, until told to relax.

c. For the PA projection (anterior view) of the esophagus, performer has patient assume a prone position:

  i) Adjusts cassette to include the area of interest as ordered. If entire esophagus is to be studied, centers to the level of the 5th or 6th thoracic vertebra.
  ii) Has patient rest head on chin. Adjusts head so that median sagittal plane is at right angles to film. Has patient rotate and depress shoulders forward, flex elbows, and place back of hands well down on hips. Adjusts shoulders in a single transverse plane with clavicles below the apices. Has patient keep shoulders in contact with cassette or table top. Makes sure that there is no rotation of body.
  iii) Directs central ray at right angles to the center of the film.

d. For a lateral projection of the esophagus:

  i) Performer may maintain patient in PA prone position on table and elevate thorax, placing patient's arms above head. Adjusts upright cassette holder on side of interest next to table or places a grid cassette upright on table and supports so that x-ray beam

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may be directed across table to film. Centers to the 5th or 6th thoracic vertebra or the center of area of interest. Directs central ray at right angles to midpoint of film across table

ii) Performer may have patient lie in lateral recumbent position with head elevated and supported. Centers film holder to the level of the 5th or 6th thoracic vertebra with the mid-axillary line of body at midline of film. Adjusts head so that median sagittal plane is parallel with film. Provides support to head and lower thorax so that the long axis of the cervicothoracic vertebrae is parallel to film. Depresses shoulder on side away from film. Immobilizes by having patient grasp dorsal surface of thigh or an anchored hand-hold. Adjusts body in exact lateral position. Directs central ray at right angles to midpoint of film.

e. For a PA oblique projection (anterior oblique view) of the esophagus, performer chooses the right anterior oblique view unless otherwise ordered:

i) Performer has patient begin in or move from the prone position. Rotates patient so that thorax is at an angle of 45° with table top or film holder, with right shoulder and breast in contact with cassette or holder and head resting on right cheek. May provide soft support under chest.

ii) Centers film to the chest at the level of the 5th or 6th thoracic vertebra.

iii) Has patient support himself or herself on the forearm and

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flexed knee of the elevated (left) side.

iv) Directs central ray at right angles to center of film at level of 5th or 6th thoracic vertebra.

f. For radiographic demonstration of hiatal hernia and/or esophageal regurgitation, performer notes whether supine or prone modifications of the Trendelenburg position will be used, the degrees to which the head end of the table will be lowered, whether any head rotation will be employed, and whether patient will be positioned over a semicylindrical radiolucent compression device or special 34° padded angle board. If the latter is ordered, plans on no additional contrast and plans to use modified Valsalva or Muller maneuver:

i) For variations of supine positions, performer adjusts patient in supine position. Centers thorax to the midline of table and centers cassette to the level of the 6th or 7th thoracic vertebra. As ordered, lowers the head end of table 10° to 15° or 25° to 30°. If so ordered, rotates patient slightly to the right side and supports elevated side. Directs central ray at right angles to the midpoint of the film.

ii) If a semicylindrical radiolucent compression device is to be used, performer has patient lie prone on table and then assume a modified knee-chest position. Performer places the compression device transversely

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under the abdomen, just below the costal margin. Performer then adjusts patient in a 40° to 45° right PA oblique position, as described in (e) above, with head resting on cheek. Centers thorax to midline of table. Directs central ray at right angles to the long axis of patient's back at the level of the 6th or 7th thoracic vertebra. Centers midpoint of film to coincide with midpoint of central ray as it will emerge at the anterior surface of the body.
Has patient hold barium mixture in left hand and supplies drinking tube or straw. Demonstrates to patient how to drink mixture in rapid continuous swallows.

iii) If a 34° padded angle board is to be used, performer places the device on the table and inserts cassette into tray incorporated into device. Centers film area to midline of table. Performer assists patient to assume kneeling position on table with thighs against board and median sagittal plane of body centered to film area of device. Asks or assists patient to lean straight forward and rest full weight on padded surface of board. Centers xiphoid process to film area. Directs central ray at right angles to the plane of the film at its midpoint. Demonstrates to patient how to perform modified Valsalva or Muller maneuver.

18. If performer is to take immediate overheads of the stomach and/or duodenum, performer notes the positions

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and views ordered and the area of interest. Notes whether patient is to swallow additional barium mixture and when. Does not use compression band unless so ordered.

a. Performer notes any centering mark made by physician to show the location of the pylorus (and whether made with patient erect or recumbent); or performer judges the location of the pylorus based on the patient's type of body (habitus) and the evidence of the scout film. If both erect and recumbent positions are ordered, centers three to six inches lower for erect positioning than for recumbent positions, allowing greater change for thin, asthenic patient.
b. Performer has patient drink additional barium mixture if so ordered.
c. For a PA projection (anterior view) of the stomach and duodenal bulb, performer notes whether erect or prone position is ordered and whether central ray is to enter at right angles to film or to be angled.

   i) Has patient assume a prone position on table or erect position facing upright cassette holder. If prone patient is thin, supports thorax and pelvis. Has erect patient distribute weight evenly.
   ii) If central ray is to be directed at right angles, performer centers patient so that the sagittal plane passing about 2.5 inches to the left of the marked or estimated location of the pylorus is at the midline. Centers film at the level of the py-

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lorus as estimated or marked, and allows for difference in erect or prone centering. Directs central ray at right angles to midpoint of film.

iii) If the central ray is to be angled, has patient lie in prone position with the median sagittal plane centered to the midline. Places film lengthwise so that upper edge is at the level of the chin. Directs the central ray to the midpoint of the film at an angle of 25° to 45° cephalad, as ordered.

d. For a right PA oblique projection (right anterior oblique view) of the stomach and duodenal loop, performer notes the degree of rotation required depending on the patient's body type. Unless otherwise ordered, positions hypersthenic (large, obese) patient with greater degree of rotation than thinner patients. Plans for 10° to 15° degree changes in obliquity of body between 40° to 70°, with exposures taken at 30 to 40 second intervals or as ordered. Marks cassettes with notation of time elapse:

i) Performer positions patient in the prone position with head resting on right cheek and right arm alongside body. Rotates body so that left side is elevated. Has patient support himself or herself on left forearm and flexed knee and adjusts rotation for the desired degree, depending on body type and the given exposure of the series involved.

ii) Centers patient so that a longitudinal plane halfway between the spinal column and the anterior left surface is at the midline. Centers film at the marked or estimated level of the pylorus.

iii) Directs central ray at right angles to midpoint of film.

iv) Rehearses patient in suspending breathing at end of exhalation for exposure and remaining in position until directed to change rotation for next exposure in series.

e. If lateral projections are ordered, performer notes whether right or left projections are involved

i) For a left lateral projection of the left retrogastric space, performer positions patient in erect lateral position before an upright holder with left side against film holder.

ii) For a right lateral projection of the right retrogastric space, duodenal loop and duodenojejunal junction, performer positions patient in lateral recumbent position lying on right side. Has patient grasp side of table or stand for support.

iii) Centers body so that a coronal plane passing midway between the midaxillary line and the anterior surface of the abdomen is at the midline. Centers at the marked or estimated level of the pylorus and allows for difference in erect or prone centering if marked position was made while patient was in opposite position from the one for this exposure.

iv) Directs central ray at right angles to the midpoint of the film.

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f. For an AP projection (posterior view) of the fundus of stomach, antrum, posterior stomach wall, retrogastric portion of duodenum and jejunum, or to study gross diaphragmatic herniations, performer notes orders for centering, body rotation and/or degree of Trendelenburg angulation:

   i) Performer positions patient in the supine position either centered to the midline or with a sagittal plane passing halfway between the median sagittal plane and left side of thorax at the midline,as directed. Unless otherwise ordered, centers film to the marked or estimated level of the pylorus.

   ii) For thin patients or if so ordered (for diaphragmatic herniations), performer rotates the body slightly towards the left with right side against table and/or tilts head end of table down in a Trendelenburg position.

   iii) Performer directs the central ray at right angles to the midpoint of the film.

g. If a biplane projection has been ordered for study of retrogastric soft tissues, performer prepares for filming with patient in supine position. Notes centering point marked by radiologist. Plans to make projections as quickly as possible after placing patient in supine position:

   i) If biplane equipment is available, sets up tubes for AP and horizontal lateral projections.

   ii) If biplane equipment is not available, performer adjusts central ray and film first for lateral filming with tube directed horizontally across patient from left to right, with vertical cassette holder placed on right side of patient, and patient in supine position.

   iii) Performer positions patient in the supine position with the left side of the body centered to the midline of the table.

   iv) Centers vertical cassette for lateral filming to localization point indicated by radiologist. Centers cassette in bucky for AP projection to the level of the localization point.

   v) Directs central ray at right angles to the midpoint of the film for each exposure.

   vi) If no biplane equipment is available, instructs patient to retain position after lateral exposure while performer repositions tube and places cassette for AP exposure. Plans to make both exposures at the same phase of suspended expiration.

h. Throughout procedure performer remains alert for any symptom of severe pain or adverse reaction, especially to contrast. As soon as performer judges that reaction may be severe, ceases exposure and notifies radiologist or attending physician at once.

19. Performer sets up for exposure after positioning patient:

   a. Performer sets the focal-film distance if not already done as appropriate. Operates controls or manually moves the x-ray tube

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into place over the film holder (or at right angles to upright holder). Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.

b. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size. Uses cross-hair shadows as reference for center of field. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired.

c. Once the patient has been positioned and immobilized, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). For small fields performer attaches an auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the area(s) of interest.

d. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that proper protective shielding has been provided to patient and everyone who will remain in room.

e. When everything is ready for the exposure, performer reminds patient of the cooperation and breath control to be used for exposure. Observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

f. Performer returns to control room. Makes sure controls are properly set, that equipment is set for radiography mode, and that patient is still in position.

g. Calls or uses intercom to remind patient of what to do in relation to breathing, swallowing contrast, holding breath and/or carrying out maneuver as rehearsed.

20. Performer determines when to make the exposure as appropriate:

a. For esophagus, proceeds as follows:

i) If patient is to swallow contrast bolus and has not been given instructions to hold breath, performer makes exposure immediately after deglutition.

ii) If respiration has been suspended, performer waits one or two seconds to allow involuntary movement of viscera to subside and then makes exposure.

iii) If patient is drinking in rapid swallows, performer makes exposure after third or fourth swallow.

iv) If a Valsalva or modified Valsalva or Muller maneuver is being carried out, performer makes exposure during the maneuver.

b. For stomach and/or duodenum, performer makes exposure after the patient has been instructed to breathe out and hold unless otherwise ordered:

List Elements Fully | **List Elements Fully**

i) For right anterior oblique series performer makes exposure and removes cassette; reinserts cassette and changes the obliquity of patient's position 10° to 15°. Makes exposures at 30 to 40 second intervals and continues as appropriate until completed. Makes sure that cassettes are marked for proper time elapse.

ii) If a biplane study has been ordered and automatic biplane equipment is not available, performer has patient retain position while first cassette is removed (lateral view) and second cassette is placed for the AP projection, centered to the area of interest. Makes both exposures on the same phase of suspended respiration.

21. Performer initiates exposure by pressing hand trigger or exposure control button.

a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.
c. With phototimer notes whether back-up timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure.
d. After exposure is completed tells patient that he or she can relax.
e. If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.
f. After exposure removes cassette and removes markers for further use.
g. Repeats radiography for all the exposures ordered by radiologist, adjusting technical factors, tube, and position of patient or film holder as appropriate to each view ordered. Repeats identification, collimation, shielding, orders for breath control and exposure as above.

22. Performer arranges to have spot films, overheads, and any cine film processed at once:

a. May sign or have radiologist sign requisition sheet.
b. Checks that equipment is turned off.
c. With cassette spot films and overhead exposures, removes any markers for further use. Attaches ID card for use with flasher if appropriate.
d. With spot film camera, performer advances the film so that all exposures made will be wound on the take-up spool in the roll film cassette. Replaces dark slide on camera lens. Uses device to cut film and create a light shield. Resets counter and removes film cassette.
e. With cineradiography, performer checks that cine camera is turned off and that the film transport mechanism has come to a complete stop. Unlocks and removes film magazine.

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f. Performer arranges to have overheads, spot films and cine film processed at once if appropriate or decides to process personally.

g. While films are being processed, makes sure that patient is comfortable and, if necessary, attended by radiologist, staff member, or self.

23. When the overheads and spot films have been processed and returned, performer places on view boxes. May also hang scout and prior films. May give processed cine film to radiologist and set up cine projector and screen. Informs radiologist that radiograph(s) are ready for viewing.

a. Performer makes note of radiologist's decisions regarding adequacy of the radiographs:

i) If radiologist decides to have patient swallow more contrast medium, performer assists as above and with any fluoroscopy and spot filming. Repeats additional overhead radiography as ordered.

ii) If the radiologist indicates that there is any problem with the technical factors or the patient positioning for overheads, performer records or notes for use in "retakes." Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes." If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member. If request for retakes reflects the preference for density or contrast of the radiologist, performer notes for future use to avoid future "retakes."

iii) If radiologist requires additional views and/or positions, performer repeats overhead filming as appropriate to new projections, as described above.

iv) For further overhead exposures performer repeats appropriate steps including identification of cassette, use of R-L and series markers, selection and setting of technique, swallowing of additional contrast mixture, positioning patient and equipment for focus-object-film alignment, collimation, shielding, breathing instructions, making exposure, and processing, as described above.

v) Performer refrains from commenting on the films or providing any interpretation to patient.

vi) Performer shows subsequent sets of spot films and radiographs to radiologist as processed, and proceeds as described above until radiologist indicates that this stage of examination is completed.

b. Performer makes note of radiologist's decision regarding any delayed filming such as motility study, delayed films:

i) Notes any orders for delineation of the small bowel; timing, and position required.

ii) Notes any orders to proceed to air contrast study of stomach and timing.

iii) Notes any orders for gastrointestinal motility study, centering, positioning and time intervals.

iv) Notes any order for other delayed films and the time elapse required.

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- v) If appropriate has radiologist fill out or sign requisition order for delayed filming.
- vi) If appropriate has radiologist authorize witholding order for food or drink until delayed filming is completed.

c. If radiologist decides to order another barium study or decides to do an air contrast study of stomach at a later time, performer may have radiologist fill out requisition sheet. May arrange for scheduling.

24. If delayed films are ordered, performer proceeds as follows:

a. May return to patient to reinforce orders on taking nothing by mouth until all radiography is completed. With in-patient may arrange to have nursing staff in charge of patient's care informed.

b. Performer may arrange to have patient taken to appropriate holding area. Keeps track of the time elapsed. If appropriate, makes sure that patient is in the care of a staff person who will transport to appropriate location and return patient at appropriate time.

25. At appropriate time(s) and as often as appropriate to complete delayed series, performer carries out steps for delayed filming as ordered, following similar positioning and exposure steps as described above.

a. Performer takes films of the small bowel as ordered. Positions in supine position unless otherwise ordered and centers to include the pubic symphysis.

b. If a delayed film is ordered of stomach after 2 or 3 hours, performer may position for right PA oblique projection unless otherwise ordered.

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c. If a gastric-motility series is ordered, and/or a small intestines motility series, performer positions and centers as appropriate as the barium column progresses:

- i) While the stomach is included, positions patient in prone PA position and centers film to include stomach.
- ii) When the stomach is empty, positions patient in supine AP position and centers film to include the pubic symphysis.

d. If a compression study of the ileocecal region and appendix is ordered, performer positions as ordered and may apply compression band.

e. In all delayed series performer makes sure to include time-interval marker on each film.

f. Performer makes radiographs and arranges for processing as described above. Depending on institutional arrangements performer places processed delayed radiographs for later viewing by radiologist or places on view boxes as processed and informs radiologist that they are ready and notes radiologist's further orders.

26. When the radiographic series are completed, or at intervals during procedure, performer may carry out termination or follow-up procedures:

a. Performer may have patient cleansed; may have room and equipment cleaned; has any other appropriate clean up procedures followed to avoid infection or contamina-

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tion,or decides to do personally, depending on institutional arrangements. Removes any markers from patient's body.

b. If appropriate, reinforces instructions to patient on use of cathartic or, if there is contraindication of cathartic, drinking of water and mineral oil until stools are cleared of contrast medium.
c. May decide to assist patient from table or to chair. Makes sure patient is reminded of any footrest in stepping off table. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient.
d. Performer may have patient transported to next assigned location, or decides to do personally, as appropriate. If appropriate, makes sure that patient is in the care of a staff person who will transport to appropriate next location or, if out-patient, will arrange to discharge or send patient home with escort as appropriate.
e. Performer records the examination according to institutional procedures. May include date, room, examination type, the overhead views taken, the technical factors used, and film sizes. May record the number of exposures made of each spot film and overhead view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. Signs requisition sheet.
f. Performer may record the fluoroscopy examination including exposure time and rad dosage.
g. May present requisition form to radiologist for comments and signature. May present forms for requisitions for later delayed films and/or additional examination(s).
h. Performer may decide to jacket radiographs, requisition sheets, and related materials, and/or have information recorded in log book personally, or have this done, depending on institutional procedures.
i. May indicate to appropriate staff person when the performer is ready to proceed with next examination.

TASK DESCRIPTION SHEET

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1. **What is the output of this task?** (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured;abdomen measured; films identified;technical factors selected and set for fluoroscopy,spot filming,overheads;scouts taken; radiologist assisted with catheter,contrast,positioning,fluoroscopy;overhead exposures and series made; radiographs sent for processing,taken to radiologist; procedures repeated as ordered;pt. returned;examination recorded;radiographs placed for use.

2. **What is used in performing this task?** (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, medical-technical history,prior radiographs;scouts; view boxes;pen;x-ray generator,control panels,tube, bucky,table,collimator;fluoroscopy unit,image intensifier,spot film device,TV monitor;cassettes;roll film;R-L,ID,timing markers;procedure tray;emergency cart;barium colloidal suspension;sterile lubricant, nasoenteric tube,syringes;phone;stool;calipers;emesis basin;waterproof sheeting;lead aprons,shielding;immobilization devices;technique,standard view,tube rating,rad exposure charts;calipers;phantom or test object;stretcher or wheelchair;intercom;forms

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. **If "Yes" to q. 3:** Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-pediatric patient to have small intestine intubation radiography;radiologist;co-workers;nurse

5. **Name the task** so that the answers to questions 1-4 are reflected. Underline essential words.

Taking small intestine intubation radiographs of a non-pediatric pt., by reviewing request;preparing equipment;preparing and reassuring pt.;measuring abdomen;setting up for fluoroscopy and spot filming; arranging for scout films as ordered;setting technical factors;identifying films;providing shielding; assisting with insertion of catheter,use of contrast, positioning of pt.,fluoroscopy,spot filming;taking overhead radiographs and series as ordered;arranging for processing;taking to radiologist;continuing,repeating as ordered;having pt. returned;placing radiographs for use;recording.

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Performer receives or obtains the x-ray requisition form, patient identification card, and any appropriate medical-technical history for a non-pediatric patient scheduled for a small intestine study involving gastrointestinal intubation (such as small bowel enema or hypotonic duodenography) as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.
d. From co-worker.

Requisition may indicate that a nasoenteric tube has already been inserted and allowed to travel through the gastrointestinal tract to a point of obstruction, or may include orders for intubation.

Performer may also receive radiographs of prior studies such as GI series, views of intestines to show progress of the nasoenteric tube. A scout film may also be present with record of technical factors used and/or any changes necessary.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided:

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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a. Performer checks the examination called for. Notes whether intubation in connection with small bowel enema or hypotonic duodenography is called for. Notes the purpose of the study, and any special requests.

b. Notes the name of the radiologist in charge; may note the name of the referring clinician.

c. Performer reads patient's name, identification number, sex, age, weight, and height. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information or note on known pathology that could affect patient positioning, technique, or handling, such as acute condition of patient. Notes whether patient will be on a stretcher or in a wheelchair. Notes whether the use of a grid or bucky will be involved. Notes shielding needed.

d. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter, colostomy, T-tube, nasoenteric tube or other device in place; notes whether patient will be accompanied by nurse or other staff person, whether there are orders for removal of dressings from the abdominal area.

e. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete:

    i) Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative

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exposure. Notices whether examination has been done elsewhere in recent past, whether there is history of extensive radiography to report to radiologist.

    ii) Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

    iii) Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.

    iv) Notes orders for prior preparation of patient such as abstinence from smoking, food, and drink, administration of cleansing enema. May note whether these have been carried out.

f. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contra-indications to going ahead with the procedure, performer brings this to attention of radiologist in charge. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

g. If prior radiographs already on file are to be presented with scout films, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

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2. Performer goes to appropriate room for the type of examination involved and the equipment required, or notes room assigned on requisition sheet. Prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Washes hands as appropriate.
   b. Checks that procedure tray has been prepared for the study involved or decides to do personally: checks that the barium sulfate colloidal suspension has been prepared in the appropriate consistency for the study ordered. If appropriate, checks that each lumen of nasoenteric tube to be inserted is accurately identified. Checks that water is present to drink. Checks that emergency cart is present.
   c. Covers examination table with rubber sheeting and/or absorbent paper sheet.
   d. Checks that proper accessories are available for procedure including leaded rubber shielding, aprons, and gloves to be used by performer, radiologist, the patient, and/or anyone who will remain in the room during exposure.
   e. Checks that appropriate immobilization devices are present, and that there is a mattress, pads, pillows and/or blankets for comfort of patient.
   f. Makes sure that right (R) and left (L) markers are available for use and identification cards, or leaded numerals or markers.
   g. For overhead filming performer makes sure that an adequate supply of loaded cassettes are available in the examination room. Selects appropriate speed and type of film, grid, and cassette combination depending on whether a bucky or table top technique will be used and standard institutional practices. Selects size based on patient's size and area of interest. If adequate supply is not in room, arranges to obtain or decides to obtain personally.
   h. Performer prepares for identification of overhead films using equipment provided by institution:

      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information and time elapse for serial exposures.
      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
      iii) Checks identification against requisition sheet.

   i. If examination will include spot filming using a camera (attached to image intensifier) and roll film, performer checks film supply indicator to make sure that there is sufficient film in the roll film cassette.

      i) If there is insufficient roll film in camera, performer arranges to have roll film cassette loaded, or decides to do personally.
      ii) When loaded roll film cassette is obtained, performer checks loading in subdued light. Checks that end of film is cut correctly and is properly

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threaded and attached to take-up spool so that film unwinds appropriately. Checks that film is properly engaged in sprockets. Locks into operating position. If appropriate, cuts off excess film at exit port and removes. Attaches film cassette to camera and locks into place. Replaces camera cover.

iii) If there is an adequate film supply, checks that film is properly loaded.

iv) Performer advances film to compensate for any exposure of film due to installation or check.

v) Removes dark slide from camera lens.

vi) If not already done, performer writes or types a card with patient's identification information for use with spot film device. Inserts in slot in spot film camera as appropriate.

j. If examination will include spot filming using a cassette/bucky spot film device, performer checks that there is an adequate supply of appropriate size cassettes in room.

i) If there is insufficient supply of cassettes, arranges to obtain or decides to obtain personally.

ii) Performer carries out identification of the spot film cassettes as for overhead films.

iii) Performer may use controls or manually pull out spot film bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate

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"stored" position.

iv) If R-L markers are to be used with spot filming, performer tapes into place on image intensifier screen or plans to tape to patient's body.

k. If a grid will be used with the image intensifier for fluoroscopy and/or spot filming, performer positions and centers grid if not already done. May use control button or slides grid into position. May check that the grid is oriented toward the x-ray tube, with grid lines parallel to the long axis of the tube.

3. Performer reviews technical exposure factors and sets for fluoroscopy and spot filming based on standards set by the institution as appropriate for the examination involved:

a. Dons protective leaded rubber garments such as apron and gloves.

b. Makes sure that no one is in examination room or control room.

c. Performer reviews the technique chart(s) for the unit(s) to be used:

i) Locates information for the projections involved. Takes note of the exposure factors to be used for overheads, fluoroscopy, and spot filming. Considers preferences of the radiologist involved.

ii) Notes any newly posted changes in technical factors (to reflect accommodation to a change in machine output or a policy decision).

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iii) Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

d. In the control room, performer makes sure that indicator light shows that x-ray generator is "warmed up" and ready for use. Makes sure that all circuits have been stabilized. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.

e. As appropriate, performer sets x-ray generator mode selector(s) to fluoroscopic mode and for use of spot film camera or cassette device, and overhead filming.

f. Performer sets controls on image intensifier for spot film camera or cassette device:

i) For spot film camera, performer selects and sets the rate (frames per second) for the camera according to standards set for examination.

ii) For cassette spot filming, performer may select and set a standard spot film program providing for format combinations such as single, half, or quarter combinations on a single cassette and related spot film sizes. Selects program appropriate for examination or awaits orders from radiologist.

g. If not already done, performer connects TV monitor to power outlet.

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Turns on monitor and checks that "ready" light is on.

h. If appropriate, performer selects the proper field size selector (if there is dual image intensifier).

i. Performer selects and sets exposure factors for fluoroscopy:

i) Selects and sets the kVp at standard setting for the examination. May check indicator dial. With automatic density control, sets density selector as appropriate for examination.

ii) If mA is automatically controlled according to patient thickness, performer turns fluoroscope mA selector to maximum standard position. If not automatically controlled, sets as appropriate for focal spot size and examination involved.

iii) Sets fluoroscopic examination timer to maximum position.

j. If appropriate, performer selects and sets exposure factors for spot filming:

i) For conventional manual exposure control, performer selects and sets the appropriate spot film time for the examination.

ii) For automatic, phototimed exposure control, performer selects a density exposure control appropriate for the examination.

iii) Performer selects the appropriate mA for the examination and the focal spot size to be used.

iv) Performer selects and sets kVp by combining settings on one major and one minor kVp

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selector as appropriate for the examination.

4. Performer returns to examination room to set up x-ray and fluoroscope tube(s), image intensifier, collimator and accessories as appropriate for check of equipment prior to examination:

   a. Makes sure that no one is in room.
   b. Places phantom or appropriate test object on radiography table where patient's area of interest will be centered for examination.
   c. Adjusts fluoroscopic tube stand (above or below table) so that tube is at zero degrees and centered to the area of interest.
   d. If not already done, moves image intensifier and any spot film device into position; centers (over or under) the area of interest.
   e. Performer adjusts the x-ray tube to appropriate focal spot/object distance (target to object distance, TOD). For fluoroscopy adjusts distance between focal spot and image intensifier (focal spot to film distance, FFD). Makes sure that TOD is 15 inches or more. Operates controls or manually moves the x-ray tube(s) into place. Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD is obtained.
   f. Performer collimates fluoroscopy tube (and x-ray tube used for spot filming if different), depending on nature of the equipment and controls:

      i) Adjusts fluoroscopy beam shutters to the field size anticipated for fluoroscopic examination or sets shutter mode selector to automatic collimation.
      ii) Manually sets collimator for the spot film field size to be used, or selects and sets field size control to be used for automatic collimation with programmed spot film cassette exposure sequence.

   g. If appropriate, performer attaches or sets up footboard at end of tilt-table; may adjust or attach shoulder rest, hand grips, compression band.

5. If not already done, performer checks functioning of fluoroscopy equipment by entering remote control room or operating controls in examination room behind leaded screen:

   a. To check fluoroscopy mode, performer turns on TV power switch controls as appropriate. Activates fluoroscope exposure by pressing footswitch or as appropriate. Views test object being fluoroscoped on TV monitor.

      i) Performer adjusts kVp control (and mA control if appropriate) and observes effects on TV monitor to be sure that equipment is operating properly.
      ii) Checks mA meter and notes whether appropriate reading is obtained.
      iii) Performer checks that TV brightness controls are operating and adjusts for preliminary viewing.
      iv) Checks examination timer by noting whether time elapse indicator moves during exposure

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showing decreasing time left for examination. May check that exposure is terminated when maximum examination exposure time is reached.

b. To check spot film functioning, performer may move cassette or roll film into x-ray exposure field using appropriate controls.

   i) Performer activates controls for spot film exposure. Notes whether cassette or roll film transport is operating appropriately. Notes whether exposure is terminated by phototimer or, if manual timer, in time set. If appropriate, releases spot film control after exposure.
   ii) If equipment is operating appropriately, performer unloads cassette and reloads or advances roll film as appropriate. Moves bucky out of way until fluoroscopy is completed.

c. After equipment has been checked, performer shuts and resets for standard exposure factors. If performer decides that any of the equipment is not functioning properly, performer informs appropriate staff member. Arranges for alternate unit to be used.

6. When fluoroscopy equipment has been set up, performer may note whether a preliminary scout film has already been made of the patient's abdomen (done by another radiologic technologist if work is organized in this way at institution).

   a. If a scout film has already been made and viewed by radiologist, performer notes the technique used or ordered and plans technical factors for overhead radiography, adjusting for use of contrast medium.
   b. If a scout film has been made but not approved, performer places processed scout film and any prior films with patient's chart or places on view boxes for review by radiologist.
   c. If a scout film has not been made and is required before patient is seen by radiologist, performer arranges to take a "plain film" of the abdomen in the standard AP position or as ordered. Plans to proceed as for plain film radiography after readying patient.

7. Performer readies patient for examination by radiologist:

   a. Performer washes hands as appropriate. Depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
   b. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.
   c. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.
   d. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff

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member on any special precautions necessary during procedure.

e. Performer has patient assume a comfortable recumbent or seated position, as appropriate.

   i) If appropriate, places mattress, pillow or clean linen on x-ray table. May place pad, blanket or pillow to support bony prominences to provide comfort for recumbent patient.
   ii) If patient is in wheelchair may move patient in chair into position next to table. Makes sure that wheelchair is in locked position.
   iii) Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way that may be collided with by patient.
   iv) If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.
   v) If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move or have patient moved to table.

f. If patient already has a nasoenteric tube inserted,performer takes care not to dislodge tube and proceeds directly to preparations for instillation of contrast medium by radiologist.

g. If not already done, has patient's clothing removed and provides gown or drape. May assist patient or

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request assistance from nurse if there is critical illness involved. Permits patient to keep covered with gown until measurements are taken and until exposure. Treats young patient with as much courtesy as adult.

h. Performer evaluates the patient's bodily habitus to estimate the size, shape and position of the stomach. Notes whether the areas of interest are heavily covered by muscle or soft fat, whether the palpation points will be easy to find.

i. If patient has a wound, colostomy, ileostomy, or T-tube with dressing to be removed, performer checks whether zinc or iodoform paste or radiopaque gauze is being used. If so, has appropriate staff member remove dressing or tube or decides to do personally (if appropriate). Checks that radiopaque paste or gauze is completely removed.

8. If not already done, performer explains to patient what will be involved in the procedure:

   a. Depending on the examination to be done, performer describes how the nasoenteric tube will be inserted, and what cooperation will be requested of patient. May explain how to assist in passing the tube by sitting erect, leaning slightly forward,or being elevated on table. Performer may explain and reassure patient that nausea may be a normal occurrence during the procedure.
   Performer may describe what the radiologist will be doing and that overhead filming will be done. Indicates what types of positions the patient will be

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asked to assume. May demonstrate use of tilt table and reassure patient that he or she will be held safely.

b. If not already done, performer checks that orders for prior preparation for study such as diet, abstinence from food, drink, and smoking have been carried out. May check whether orders for prior evacuation or emptying of bladder (or keeping bladder full) have been given and carried out; if not already done, may arrange to have micturition orders carried out. Plans to notify radiologist if any prior orders have not been carried out.

c. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer plans to inform radiologist and to proceed only with approval.

d. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains, when asked medical questions, that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

e. Unless measurements have already been made, performer uses centimeter calipers to measure the thickness of the abdomen in the direction in which the central ray of the x-ray beam will pass through the centered part from tube to film. Records for use in

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determining exposure factors for overheads. After measuring, has patient rest in as relaxed a position as possible.

f. Performer may tape R or L marker to patient if appropriate for use in spot filming.

g. If appropriate before radiologist's examination, performer arranges to take a "plain film" scout and have it processed at once, or decides to do personally. Uses AP supine position unless otherwise ordered.

h. Performer has patient blow nose (unless nasoenteric tube is already inserted) to clear the passages.

9. Performer informs attending radiologist when patient is ready to be examined. Brings requisition sheet, patient's medical history, chart, scout films (if already done) and any prior films, including progress films of nasoenteric tube, to radiologist. Displays radiographs on view boxes.

a. If not already done, performer tells radiologist about any difficulties encountered with regard to information, possible contraindications, or anything else that should be brought to radiologist's attention. Notes any special orders or change in procedure decided by radiologist. Proceeds as ordered.

b. Performer may accompany radiologist to examination room and introduce patient to radiologist.

c. If not already done, performer awaits and carries out radiologist's orders for scout film. Presents for review as described above.

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10. During radiologist's review of requisition, scouts, prior films and examination of patient, performer notes radiologist's orders:

    a. If radiologist decides to cancel procedure, performer arranges to terminate and reschedule as appropriate.
    b. Performer notes whether radiologist requires a change in technical factors and/or patient positioning or centering for later overhead filming.
    c. Notes radiologist's orders for program and settings for spot filming as appropriate.
    d. Discusses sequence and timing of procedure with radiologist. May arrange signals for exposure, changing of spot film cassettes, operation of exposure controls.
    e. Performer arranges to provide or change any equipment or supplies as ordered by radiologist.
    f. If required, changes or adjusts technical factors, program, and settings as appropriate for fluoroscopy and spot filming.

11. Performer assists radiologist with preparations:

    a. Washes hands as appropriate.
    b. Performer gives leaded gloves and apron to radiologist. If appropriate, places leaded curtain in place. Provides patient and everyone remaining in room during exposure with appropriate protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.
    c. On signal from radiologist, performer may dim room lights. Turns on TV power switch. May go to control room and operate fluoroscope controls on orders from radiologist. Adjusts kVp and/or mA controls according to radiologist's orders.
    d. If a nasoenteric tube is to be inserted, performer may lubricate catheter tube on orders. May provide glass of water for patient to drink to assist in swallowing tube. May help position patient. May provide emesis basin if needed.

12. After the nasoenteric tube has been judged by radiologist to be in place, performer may assist with contrast instillation and spot filming:

    a. May assist radiologist to prepare syringe with contrast mixture. May help position patient for fluoroscopic viewing.
    b. Operates exposure controls as ordered, or positions table, tube, or patient as ordered.
    c. If spot film attachment uses cassettes, performer may unload as used, identify, and insert additional cassettes, as described above, throughout procedure.
    d. May operate tilt-table on orders from radiologist.
    e. Depending on institutional procedures, performer may keep radiologist informed of cumulative exposure as shown on fluoroscope timer indicator.
    f. Performer notes any orders for repeat of any part of fluoroscopic examination. Changes technical factors as ordered. Assists in continued examination as described above, repeating appropriate steps.
    g. With hypotonic duodenography performer may assist with the hypotonic phase of examination:

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i) Washes hands as appropriate observing sterile technique.
ii) If appropriate, performer opens packet of sterile gloves for radiologist, observing sterile technique so that wrapper, own hands, or other objects will not contaminate gloves.
iii) May assist by handing materials asked for.
iv) May help prepare syringes.
v) Assists with continued fluoroscopic examination and spot filming as described above and again after injection of air contrast.

13. When the radiologist informs performer that the fluoroscopic portion of the examination is over, performer notes orders for overhead filming:

    a. Notes orders on area of interest for centering, views, positions, whether series are ordered and timing, special angulation of table, breathing instructions.
    b. May discuss with radiologist any special precautions needed in patient positioning to avoid injuring patient.
    c. May have radiologist fill out and/or sign requisition sheet.

14. Performer explains to patient what overhead radiography will be done and the positions that have been ordered and then prepares for filming as follows:

    a. Performer obtains the appropriate size loaded cassette for the first (or next) projection.
    b. Performer attaches identification information to the cassette or table top:

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i) Places right or left marker on film holder or table-top as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.
ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of cassette.
iii) If patient identification information is to be entered by use of flasher, sets flash card aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.
iv) Performer may place patient's card into card tray for equipment using automatic film marking device.
v) If exposure is part of a series, places marker to indicate time elapse or the number of the exposure within the series.

    c. If cassette is to be used with bucky performer may manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.
    d. Performer sets or resets the exposure factors for the first (or next) projection:

i) Enters control room and sets control for radiography mode.
ii) Adjusts technical exposure factors to account for instructions from radiologist based

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on viewing of scout film and use of contrast material.

iii) For conventional exposure control, performer selects milliamperage and sets selectors for the correct focal spot size. Selects and sets the exposure time that will produce the mAs desired. Sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

iv) For automatic phototimed exposure control, performer selects and sets the category corresponding to the type of study and use or nonuse of screens, bucky, etc., and, if appropriate, focal spot size. Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming).
May select and set a kVp range button (if called for with equipment) corresponding to range for examination.
Sets a density selector corresponding to the usual (or special) requirements for the study. Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.

v) Depending on the equipment, may set controls to provide for use of bucky, manual adjustment of table and tube height, position, and of collimation, unless these have already been set.

15. Performer prepares patient for the final position ordered for the first (or next) exposure:

a. Keeps track of time elapse and readies patient for each exposure as appropriate.

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b. May explain or demonstrate to patient what is required. May obtain help in positioning.

c. If patient has a urinary catheter in place, performer turns patient toward the catheter and tubing to prevent separating it from drainage bottle and breaking sterile system and to avoid causing pain.
When positioning patient with a balloon catheter in place, performer makes sure that the clamp is not lying over a part to be exposed or that patient is not lying on the clamp.

d. Performer positions patient in supine AP position unless otherwise ordered. Arranges body so that its median sagittal plane is centered to the midline of table. Arranges shoulders to lie on a single transverse plane. Performer centers part and keeps the long axis of the part parallel to the film holder. When using a bucky centers patient to midline and adjusts to the level of area of interest.

16. For an AP projection (posterior view) of the fundus of stomach, antrum, posterior stomach wall, retrogastric portion of duodenum and jejunum, or to study gross diaphragmatic herniations, performer notes orders for centering, body rotation and/or degree of Trendelenburg angulation:

a. Performer positions patient in the supine position either centered to the midline or with a sagittal plane passing halfway between the median sagittal plane and left side of thorax at the

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midline, as directed. Unless otherwise ordered, centers film to the estimated level of the pylorus and includes the pubic symphysis.

b. For thin patient or if so ordered, performer rotates the body slightly towards the left with right side against table and elevated side supported.
c. May, if so ordered, tilt head end of table down in a Trendelenburg position. As ordered, lowers the head end of table 10° to 15° or 25° to 30°.
d. Performer directs the central ray at right angles to the midpoint of the film.
e. Unless otherwise ordered rehearses patient in breathing in and then breathing out when ordered, and holding until told to relax.
f. Throughout procedure performer remains alert for any symptom of severe pain or adverse reaction, especially to contrast medium. As soon as performer judges that reaction may be severe, ceases exposure and notifies radiologist or attending physician at once.

17. Performer sets up for exposure after positioning patient:

a. Performer sets the focal-film distance if not already done as appropriate. Operates controls or manually moves the x-ray tube into place. Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.
b. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the

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part. Adjusts the collimator opening to correspond to the film size. Uses cross-hair shadows as reference for center of field. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired.

c. Once the patient has been positioned and immobilized, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). For small fields performer attaches an auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the area(s) of interest.
d. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that proper protective shielding has been provided to patient and anyone who will remain in room during exposure.
e. When everything is ready for the exposure, performer reminds patient of the breath control to be used for exposure. Observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.
f. Performer returns to control room. Makes sure controls are properly set, that equipment is set for radiography mode, and that patient is still in position. Calls or uses intercom to instruct patient in breath control as rehearsed.

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g. Performer makes exposure after the patient has been instructed to breathe out and hold, unless otherwise ordered.

18. Performer initiates exposure by pressing hand trigger or exposure control button.

   a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.
   b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.
   c. With phototimer notes whether backup timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure.
   d. After exposure is completed tells patient that he or she can relax.
   e. If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.
   f. After exposure removes cassette and removes markers for further use.
   g. Repeats radiography for all the exposures ordered by radiologist in the time sequences ordered. Adjusts technical factors, tube, and position of patient or film holder if appropriate. Repeats identification, collimation, shielding, orders for breath control and exposure as above.

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19. Performer arranges to have spot films and overheads processed at once:

   a. May sign or have radiologist sign requisition sheet.
   b. Checks that equipment is turned off.
   c. With cassette spot films and overhead exposures, removes any markers for further use. Attaches ID card for use with flasher if appropriate.
   d. With spot film camera, performer advances the film so that all exposures made will be wound on the take-up spool in the roll film cassette. Replaces dark slide on camera lens. Uses device to cut film and create a light shield. Resets counter and removes film cassette.
   e. Performer arranges to have overheads and spot films processed as they are taken if appropriate, and/or decides to process personally.
   f. While films are being processed, makes sure that patient is comfortable and, if necessary, attended by radiologist, staff member, or self.
   g. Between serial filmings, performer may arrange to have patient taken to appropriate holding area. Keeps track of the time elapsed.

20. When the overhead(s) and spot films have been processed and returned, performer places on view boxes. May also hang scout and prior films. Informs radiologist that radiograph(s) are ready for viewing.

   a. Performer makes note of radiologist's decisions regarding adequacy of the radiographs:

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- i) If radiologist decides to inject more contrast medium, performer assists as above and with any fluoroscopy and spot filming. Repeats additional overhead radiography as ordered.
- ii) If the radiologist indicates that there is any problem with the technical factors or the patient positioning for overheads, performer records or notes for use in "retakes." Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes." If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member. If request for retakes reflects the preference for density or contrast of the radiologist, performer notes for future use to avoid future "retakes."
- iii) If radiologist requires additional views and/or positions, performer repeats overhead filming as appropriate to new projections, as described above.

b. For further overhead exposures performer repeats appropriate steps including identification of cassette, use of R-L and series markers, selection and setting of technique, positioning patient and equipment for focus-object-film alignment, collimation, shielding, breathing instructions, making exposure, and processing, as described above.

- i) Performer refrains from commenting on the films or providing any interpretation to patient.
- ii) Performer shows subsequent sets of spot films and radiographs

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to radiologist as processed, and proceeds as described above until radiologist indicates that examination is completed.

21. When radiologist indicates radiography is completed, performer carries out termination procedures:

    a. May assist radiologist in removal of nasoenteric tube.
    b. May have patient cleansed; may have room and equipment cleaned; has any other appropriate clean up procedures followed to avoid infection or contamination, or decides to do personally, depending on institutional practice. Removes any markers from patient's body.
    c. If appropriate, performer reinforces instructions to patient on use or nonuse of cathartic, drinking liquids, mineral water.
    d. May decide to assist patient from table or to chair. Makes sure patient is reminded of any footrest in stepping off table. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient.
    e. Performer may have patient transported to next assigned location, or decides to do personally, as appropriate. If appropriate, makes sure that patient is in the care of a staff person who will transport to appropriate next location or, if out-patient, will arrange to discharge or send patient home with escort as appropriate.
    f. Performer records the examination according to institutional procedures. May include date, room, examination type, the overhead views

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taken, the technical factors used, and film sizes. May record the number of exposures made of each spot film and overhead view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. Signs requisition sheet. g. Performer may record the fluoroscopy examination including exposure time and rad dosage. h. May present requisition form to radiologist for comments and, signature. i. Performer may decide to jacket radiographs, requisition sheets, and related materials, and/or have information recorded in log book personally, or have this done, depending on institutional procedures. j. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

TASK DESCRIPTION SHEET

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1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured;parts measured; films identified;technical factors selected and set for fluoroscopy,spot filming,overheads;scouts taken; assistance given with insertion of enema tip,flow of contrast,positioning,fluoroscopy;pre-and post-evacuation and air contrast exposures made;radiographs sent for processing,taken to radiologist;procedures repeated as ordered;clean up arranged;pt. returned; examination recorded;radiographs placed for use.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, medical-technical history,prior radiographs;scouts; view boxes;pen;x-ray generator,control panels,tube, bucky,table,collimator;fluoroscopy unit,image intensifier,spot film device,TV monitor;cassettes;roll film;R-L,ID,markers;prepared barium enema;balloon catheters or other air insufflator,syringe;tubes, clamps,rectal enema tips;colostomy dressings;bedpan; paper toweling;water-proof table covering;basin; antiseptic solutions;enema stand;phone;extension cones;stool;calipers;upright holder;lead aprons, shielding;immobilization devices;technique,standard view,tube rating and rad exposure charts;forms;phantom or test object;stretcher or wheelchair;intercom

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-pediatric patient to have barium enema radiography;radiologist;co-workers

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Taking barium enema radiographs of non-pediatric pt. by reviewing request;preparing equipment,pt.reassuring;measuring;setting up for fluoroscopy,spot filming;arranging for scout films;setting technical factors;identifying films;providing shielding;inserting enema tip;assisting with flow of contrast,fluoroscopy,spot filming,air contrast;taking pre-post-evacuation and air contrast radiographs as ordered;arranging for processing,clean up;having pt.returned; placing radiographs for use;recording.

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Performer receives or obtains the x-ray requisition form, patient identification card, and any appropriate medical-technical history for a non-pediatric patient scheduled for a barium enema study (radiographic study of the large intestine, especially colon, using barium sulfate as contrast medium) as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.
d. From co-worker.

Requisition may indicate orders for a routine study and/or be focused on a particular area of interest. Depending on institutional arrangements, performer may also receive scout film and/or prior films already taken by co-worker with record of technical factors used and/or any changes necessary.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided:

   a. Performer checks the examination called for; notes whether a routine study is ordered or specific purpose of study and any special requests.

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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Notes whether an air contrast study has been ordered.

b. Notes the name of the radiologist in charge; may note the name of the referring clinician.

c. Performer reads patient's name, identification number, sex, age, weight, and height. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information or note on known pathology that could affect patient positioning, technique, or handling such as presence of colostomy, any anal abnormality, hemorrhoids, acute symptoms. Notes whether patient will be on a stretcher or in a wheelchair. Notes whether the use of a grid or bucky will be involved,shielding needed.

d. Notes whether erect and/or recumbent positioning is called for, the overhead views ordered. Notes side of interest for lateral or oblique views ordered.

e. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter, T-tube or similar device in place; notes whether patient will be accompanied by nurse or other staff person, whether there are orders for removal of dressings from the abdominal area.

f. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete:

   i) Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether there is history of extensive radiography to bring to radiologist's notice.

   ii) Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

   iii) Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.

   iv) Notes any orders for prior preparation of patient such as prior diet, use or nonuse of cathartic, abstinence from food for given period of time, use of cleansing enemas; notes whether there is indication that these have been carried out.

g. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer brings this to attention of radiologist in charge. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

h. If prior radiographs already on file are to be presented with scout films, and if not already with patient's jacketed material,

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performer arranges to have prior films delivered.

2. Performer goes to appropriate room for the type of examination involved and the equipment required, or notes room assigned on requisition sheet. Prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Washes hands as appropriate.
   b. Checks that procedure tray has been prepared for the study involved or decides to do personally:

      i) Depending on institutional procedures and equipment, performer checks that barium enema has been prepared in proper proportions or decides to do personally. Hangs on standard or pole next to examination table. If not already done, checks that enema suspension is at proper temperature. If not already done, attaches tubing and maintains clamp in closed position.
      ii) If a closed-system disposable enema kit is to be used, performer has mixture prepared, air and excess water removed from bag, tube clamped, and mixture shaken and kneaded before hanging bag in place.
      iii) Depending on information available, performer may check that appropriate rectal tip or retention catheter is provided. Checks for air injection apparatus, bedpan, water soluble lubricant, towels. May check that local anesthetic is available.
      iv) If patient has colostomy, may check that device to prevent stomal leakage is present.
      v) If balloon catheter may be used, has it checked or decides to check personally.

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   c. Performer makes sure that examination table is provided with disposable and/or waterproof underpadding or decides to do personally. Checks that emergency cart is present or available.
   d. Checks that proper accessories are available for procedure including leaded rubber shielding, aprons, and gloves to be used by performer, radiologist, the patient, and/or anyone who will remain in the room during exposure. Checks that appropriate immobilization devices are present, and that there is a mattress, pads, pillows and/or blankets for comfort of patient on examination table.
   e. Makes sure that right (R) and left (L) markers are available for use and identification cards, or leaded numerals or markers.
   f. For overhead filming performer makes sure that an adequate supply of loaded cassettes and an upright film holder are available in the examination room. Selects appropriate speed and type of film, grid and cassette combination depending on whether a bucky or table top technique will be used and standard institutional practices. Selects size based on patient's size and area of interest. If adequate supply is not in room, arranges to obtain or decides to obtain personally.
   g. Performer prepares for identification of overhead films using equipment provided by institution:

      1) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appro-

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priate patient identification information.

ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.

iii) Checks identification against requisition sheet.

h. If spot filming during examination will involve use of a camera (attached to image intensifier) and roll film, performer checks film supply indicator to make sure that there is sufficient film in the roll film cassette.

i) If there is insufficient roll film in camera, performer arranges to have roll film cassette loaded, or decides to do personally.

ii) When loaded roll film cassette is obtained, performer checks loading in subdued light. Checks that end of film is cut correctly and is properly threaded and attached to take-up spool so that film unwinds appropriately. Checks that film is properly engaged in sprockets. Locks into operating position. If appropriate, cuts off excess film at exit port and removes. Attaches film cassette to camera and locks into place. Replaces camera cover.

iii) If there is an adequate film supply, checks that film is properly loaded.

iv) Performer advances film to compensate for any exposure of film due to installation or check.

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v) Removes dark slide from camera lens.

vi) If not already done, performer writes or types a card with patient's identification information for use with spot film device. Inserts in slot in spot film camera as appropriate.

i. If spot filming during examination will involve use of a cassette/bucky spot film device, performer checks that there is an adequate supply of appropriate size cassettes in room.

i) If there is insufficient supply of cassettes, arranges to obtain or decides to obtain personally.

ii) Performer carries out identification of the spot film cassette as for overhead films.

iii) Performer may use controls or manually pull out spot film bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position.

iv) If R-L markers are to be used with spot filming, performer tapes into place on image intensifier screen or plans to tape to patient's body.

j. May position and center grid to be used with image intensifier and check that grid is oriented properly.

3. Performer reviews and sets technical exposure factors for fluoroscopy and spot filming based on standards set by the institution appropriate for the examination involved:

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a. Dons protective leaded rubber garments such as apron and gloves.

b. Makes sure that no one is in examination room or control room.

c. Performer reviews the technique chart(s) for the unit(s) to be used:

   i) Locates information for the projections involved. Takes note of the exposure factors to be used for overheads, (pre- and post-evacuation and air contrast), fluoroscopy, and spot filming. Considers preferences of the radiologist involved.

   ii) Notes any newly posted changes in technical factors (to reflect accommodation to a change in machine output or a policy decision).

   iii) Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

d. Makes sure that indicator light shows that x-ray generator is "warmed up" and ready for use. Makes sure that all circuits have been stabilized. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.

e. As appropriate, performer sets x-ray generator mode selector(s) to fluoroscopic mode and for use of spot film camera or cassette device, and overhead filming.

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f. Performer sets controls on image intensifier for spot film camera or cassette device:

   i) For spot film camera, performer selects and sets the rate (frames per second) for the camera according to standards set for examination.

   ii) For cassette spot filming performer may select and set a standard spot film program providing for format combinations such as single, half, or quarter combinations on a single cassette and related spot film sizes. Selects program appropriate for examination or awaits orders from radiologist.

g. If not already done, performer connects TV monitor to power outlet. Turns on monitor and checks that "ready" light is on.

h. If appropriate, performer selects the proper field size selector (if there is dual image intensifier).

i. Performer selects and sets exposure factors for fluoroscopy:

   i) Selects and sets the kVp at standard setting for the examination. May check indicator dial. With automatic density control, sets density selector as appropriate for examination.

   ii) If mA is automatically controlled according to patient thickness, performer turns fluoroscope mA selector to maximum standard position. If not automatically controlled, sets as appropriate for focal spot size and examination involved.

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iii) Sets fluoroscopic examination timer to maximum position.

j. If appropriate, performer selects and sets exposure factors for spot filming:

  i) For conventional manual exposure control, performer selects and sets the appropriate spot film time for the examination.
  ii) For automatic, phototimed exposure control, performer selects a density exposure control appropriate for the examination.
  iii) Performer selects the appropriate mA for the examination and the focal spot size to be used.
  iv) Performer selects and sets kVp by combining settings on one major and one minor kVp selector as appropriate for the examination.

4. Performer returns to examination room to set up x-ray and fluoroscope tube(s), image intensifier, collimator and accessories as appropriate for check of equipment prior to examination:

  a. Makes sure that no one is in room.
  b. Places phantom or appropriate test object on radiography table where patient's area of interest will be centered for examination.
  c. Adjusts fluoroscopic tube stand (above or below table) so that tube is at zero degrees and centered to the area of interest.
  d. If not already done, moves image intensifier and any spot film device into position; centers (over or under) the area of interest.
  e. Performer adjusts the x-ray tube to appropriate focal spot/object distance (target to object distance, TOD). For fluoroscopy, adjusts distance between focal spot and image intensifier (focal spot to film distance, FFD). Makes sure that TOD is 15 inches or more. Operates controls or manually moves the x-ray tube(s) into place. Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD is obtained.
  f. Performer collimates fluoroscopy tube (and x-ray tube used for spot filming if different), depending on nature of the equipment and controls:

    i) Adjusts fluoroscopy beam shutters to the field size anticipated for fluoroscopic examination or sets shutter mode selector to automatic collimation.
    ii) Manually sets collimator for the spot film field size to be used, or selects and sets field size control to be used for automatic collimation with programmed spot film cassette exposure sequence.

  g. If appropriate, performer attaches or sets up footboard at end of tilt-table; may adjust or attach shoulder rest, hand grips.

5. If not already done, performer checks functioning of fluoroscopy equipment by entering remote control room or operating controls in examination room behind leaded screen:

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a. To check fluoroscopy mode, performer turns on TV power switch controls as appropriate. Activates fluoroscope exposure by pressing footswitch or as appropriate. Views test object being fluoroscoped on TV monitor.

  i) Performer adjusts kVp control (and mA control if appropriate) and observes effects on TV monitor to be sure that equipment is operating properly.
  ii) Checks mA meter and notes whether appropriate reading is obtained.
  iii) Performer checks that TV brightness controls are operating and adjusts for preliminary viewing.
  iv) Checks examination timer by noting whether time elapse indicator moves during exposure showing decreasing time left for examination. May check that exposure is terminated when maximum examination exposure time is reached.

b. To check spot film functioning, performer may move cassette or roll film into x-ray exposure field using appropriate controls.

  i) Performer activates controls for spot film exposure. Notes whether cassette or roll film transport is operating appropriately. Notes whether exposure is terminated by phototimer or, if manual timer, in time set. If appropriate, releases spot film control after exposure.
  ii) If equipment is operating appropriately, performer unloads cassette and reloads or advances roll film as appropriate. Moves bucky out of way until fluoroscopy is completed.

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c. After equipment has been checked, performer shuts and resets for standard exposure factors. If performer decides that any of the equipment is not functioning properly, performer informs appropriate staff member. Arranges for alternate unit to be used.

6. When fluoroscopy equipment has been set up, performer may note whether a preliminary scout film has already been made of the patient (done by a co-worker if work is organized in this way at the institution).

  a. If a scout film has already been made and viewed by radiologist, performer notes the technique used or ordered and plans technical factors for overhead radiography, adjusting for use of barium contrast medium.
  b. If a scout film has been made but not approved, performer places processed scout film and any prior films with patient's chart or places on view boxes for review by radiologist.
  c. If a scout film has not been made and is required before patient is seen by radiologist, performer arranges to take a "plain film" of the abdomen in standard AP position or as ordered. Plans to proceed as for plain film radiography after readying patient.

7. Performer readies patient for examination by radiologist:

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a. Performer washes hands as appropriate. Depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.

b. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

c. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

d. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

e. If not already done, has patient's jewelry and clothing removed and provides gown or drape with opening in back (or as appropriate for location of colostomy). May assist patient or request assistance from nurse if there is a critical illness involved. Permits patient to keep covered with gown until measurements are taken and until exposure. Treats young patient with as much courtesy as adult.

f. If not already done, may place padding and waterproof covering on table. Has patient assume a comfortable recumbent or seated position, as appropriate.

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i) If patient is in wheelchair may move patient in chair into position next to table. Makes sure that wheelchair is in locked position.

ii) Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way that may be collided with by patient.

iii) If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.

iv) If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move or have patient moved to table.

g. Performer evaluates the patient's bodily habitus to estimate the size, shape and position of the abdominal organs and variations in location between erect and recumbent positions for later centering. Notes whether the areas of interest are heavily covered by muscle or soft fat, whether the palpation points will be easy to find. Notes whether the extremities are of unequal length. Notes whether patient is extremely wide in abdominal area and will require two exposures for views ordered, one centered to include the diaphragm and the second centered to include the rectal area, with films placed transversely.

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h. If patient has a wound, colostomy, ileostomy, or T-tube with dressing to be removed, performer arranges to have this done or decides to do personally using sanitary technique. If zinc or iodoform paste or radiopaque gauze is being used, performer checks that radiopaque paste or gauze is completely removed. Checks that patient has a fresh dressing available; may supply a temporary dressing for use until enema tip is inserted.

i. If patient is to be radiographed in erect position, performer adjusts vertical film holder to appropriate height for patient and moves out of the way until needed.

8. If not already done, performer prepares patient for the procedure:

   a. Performer explains the process of instilling the barium mixture. May indicate that some cramping may occur. Indicates the positions patient will be in, tube insertion, and what instructions radiologist may give to direct the flow of the barium.

      i) Performer instructs patient in keeping the anal sphincter contracted against rectal tube to hold it in position and retain enema.

      ii) May rehearse patient in deep oral breathing to ease cramping. Assures patient that enema will be stopped if cramping is severe.

      iii) Indicates to patient how enema will be evacuated (returned by way of tube with disposable kit, or use of basin, and/or going to bathroom).

   b. Performer stresses importance of retaining enema until told to evacuate. May question patient to determine whether patient is able to retain an enema; plans to report information to radiologist.

   c. Explains what the radiologist and performer will be doing, the spot filming, overhead filming with enema retained, evacuation, post-evacuation filming and possible use of air contrast enema, with need to use anal sphincter to retain air.

   d. Performer assures patient about privacy and the assistance that will be available to patient to avoid embarrassment if patient cannot retain enema.

   e. If patient is suffering from inflamed anus, hemorrhoids, or anal abnormality, performer may have patient lie in prone, knee-chest position while performer applies local anesthetic such as suppository and/or salve. May have this done or have patient apply personally. Performer uses gloves or supplies gloves and discards after use. Washes hands.

   f. Performer may demonstrate how tilt-table will be used and reassure patient that he or she will be held safely.

   g. If not already done, performer may question patient to check that prior preparations were carried out. If not, may arrange to have these done or plans to notify radiologist.

   h. As appropriate and if not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer plans to inform radiologist and to proceed only with approval.

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i. Performer answers patient's non-medical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains, when asked medical questions, that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

j. Unless measurements have already been made, performer uses centimeter calipers to measure the thickness of the abdomen in the directions in which the central ray of the x-ray beam will pass through the centered part from tube to film. If both recumbent and erect positioning will be used for radiography of abdominal contents, performer measures or estimates thickness in both positions.

i) In locating iliac crest, performer is careful not to center too high by making sure not to confuse the iliac crest with the heavy muscles immediately above the crest. May have patient inhale deeply and breath out; then palpates the point of the crest while the muscles are relaxed.

ii) If performer believes that patient will be embarrassed by palpation of the symphysis pubis, uses the most prominent point of the greater trochanter to locate the same transverse plane.

iii) Records measurements for determining exposure factors for overheads.

iv) After measuring, has patient rest in as relaxed a position as possible.

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k. Performer may tape R or L marker to patient if appropriate for use in spot filming.

l. If appropriate before radiologist's examination, performer arranges to take "plain film" scout of abdomen and have processed at once, or decides to do personally. Uses standard AP supine position centered to iliac crest,or follows special orders or standard institutional procedure.

9. Performer informs attending radiologist when patient is ready to be examined. Brings requisition sheet, patient's medical history, chart, scout film (if already done) and any prior films to radiologist. Displays radiographs on view boxes.

a. If not already done, performer tells radiologist about any difficulties encountered with regard to information, possible contraindications, or anything else that should be brought to radiologist's attention. Notes any special orders or change in procedure decided by radiologist. Proceeds as ordered.

b. Performer may accompany radiologist to examination room and introduce patient to radiologist.

c. If not already done, performer awaits and carries out radiologist's orders for scout film and proceeds as appropriate. Presents processed scout for review as described above.

10. During radiologist's review of requisition, scout, prior films and examination of patient, performer notes radiologist's orders:

a. If radiologist decides to cancel procedure, performer may arrange

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to terminate, record,and reschedule as appropriate. May reinforce patient in proper preliminary preparation for examination or have this done.

b. Performer notes whether radiologist requires a change in technical factors and/or patient positioning or centering for later overhead filming.

c. Notes radiologist's orders for program and settings for spot filming and/or technical factors for fluoroscopy. Sets or changes as appropriate.

d. Performer notes radiologist's orders on use of simple rectal enema tip, use of balloon catheter or other retention device, probable use of air contrast. Arranges to provide any equipment missing or to be changed. If balloon catheter is to be used, makes sure that it has been checked for defects.

e. Readjusts height of enema on stand if so ordered.

f. Discusses sequence and timing for procedure with radiologist. May arrange signals for flow of enema, exposure, changing of spot film cassettes, operation of exposure controls.

11. Performer prepares for insertion of enema:

a. Performer gives leaded gloves and apron to radiologist. If appropriate, places leaded curtain in place. Provides patient and everyone remaining in room during exposure with appropriate protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

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b. Washes hands as appropriate and dons gloves.

c. Performer unclamps enema tube and allows the barium to run out into basin to expel air; reclamps.

d. Performer lubricates rectal tip, balloon catheter tip, or stomal catheter tip with water soluble lubricant.

e. If performer will position patient for enema, performer assists patient to lie prone on table, and then turn onto left side, lean forward, and draw up right knee and thigh, with left knee slightly flexed. Reassures patient. May adjust lamp.

f. Has patient with colostomy lie on back.

g. Adjusts gown to expose only anus or stoma. Waits while radiologist inserts stomal catheter.

h. If performer will insert rectal tip or balloon catheter tip, performer proceeds as follows:

i) May place rectal tube or balloon tip in fold of several sheets of paper toweling.

ii) Exposes anus and inspects condition, such as presence of hemorrhoids, so as to anticipate correct insertion technique.

iii) Reassures patient and has him or her relax anal sphincter.

iv) Pushes right buttock upward to open gluteal fold.

v) On relaxed exhalation of patient, performer slowly inserts catheter or rectal tip into anal opening, forward for about an inch, then following curve of rectum, slightly backward. Inserts no more than four inches.

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vi) If patient indicates severe pain or if performer cannot insert tip easily, performer informs radiologist at once.

vii) If balloon catheter is to be used, inserts and indicates when tip has been inserted in rectum. Waits while radiologist inflates the catheter balloon by attaching syringe to balloon lumen and injecting water or air to inflate balloon inside rectum. May indicate to radiologist when catheter is being held in place. May clamp off lumen and disconnect syringe. Inserts a self-sealing device or uses clamp.

i. If radiologist has inserted stomal catheter, performer may supply adhesive and/or toweling to hold stomal catheter in place. May attach tubing of enema container to stomal catheter. May assist while radiologist adjusts stomal device so that patient can hold it in position between buttocks.

j. Once rectal tip has been inserted, performer holds tube in place and assists patient to turn to supine or prone position as ordered. Performer adjusts underpadding and adjusts tubing to ensure free flow of enema mixture.

12. Performer assists radiologist with enema flow and fluoroscopy:

a. Removes gloves and washes hands as appropriate. May put on fresh gloves.

b. On signal from radiologist, performer may dim room lights. Turns on TV power switch. May go to control room and operate fluoroscope controls on orders from radiologist. Adjusts kVp and/or mA controls according to radiologist's orders.

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c. Performer stands to the right of radiologist and controls the flow of the barium sulfate mixture as ordered. Opens clamp and reclamps as ordered. Checks that enema is flowing. Reassures patient and reminds patient to retain enema.

d. If appropriate, lowers enema bag or can on orders to relieve pressure on patient. If appropriate, provides basin for patient to relieve pressure. Carries out appropriate sanitary clean-up steps as required if there is soiling.

e. Performer may assist radiologist with spot filming:

i) Operates exposure controls as ordered, or positions table, tube, or patient as ordered.

ii) If spot film attachment uses cassettes, performer may unload as used, identify, and insert additional cassettes, as described above, throughout procedure.

f. Performer may help radiologist to position patient. May operate tilt table on orders from radiologist.

g. Depending on institutional procedures, performer may keep radiologist informed of cumulative exposure as shown on fluoroscope timer indicator.

h. Performer notes any order for repeat of any part of fluoroscopic examination. Changes technical factors as ordered. Assists in continued examination as described above, repeating appropriate steps.

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13. When the radiologist informs performer that the fluoroscopic portion of the examination is over, performer notes orders for immediate overhead filming with enema retained and post-evacuation films. Notes whether standard views and positions are ordered and/or special views and positions. Notes orders for recumbent or sitting positions.

    a. May discuss with radiologist any special precautions needed in patient positioning to avoid injuring patient.
    b. May have radiologist fill out and/or sign requisition sheet.

14. Performer explains to patient what overhead radiography will be done and quickly prepares for filming as follows:

    a. Performer obtains the appropriate size loaded cassette(s) for the first (or next) projection(s).
    b. Performer attaches identification information to the cassette(s) or table top:

        i) Places right or left marker on film holder or table-top as appropriate to the study and projection or depresses appropriate R or L button for automatic marking.
        ii) If patient's identification information is in the form of lead numerals, performer places on appropriate corner of cassette.
        iii) If patient identification information is to be entered by use of flasher, sets flash card aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.

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        iv) Performer may place patient's card into card tray for equipment using automatic film marking device.

    c. If cassette is to be used with bucky (under tabletop or in upright holder) performer may manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.
    d. Performer may place cassette in upright holder at right angles to table top or in other position selected.
    e. Performer sets or resets the exposure factors for the first (or next) projection:

        i) Enters control room and sets control for radiography mode.
        ii) Adjusts technical exposure factors to account for instructions from radiologist based on viewing of scout film, use of barium contrast, and/or measured change of thickness of abdomen between erect and recumbent positioning, extreme fat or muscularity.
        iii) For conventional exposure control, performer selects milliamperage and sets selectors for the correct focal spot size. Selects and sets the exposure time that will produce the mAs desired. Sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.

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iv) For automatic phototimed exposure control, performer selects and sets the category corresponding to the type of study and use or nonuse of screens, bucky, etc., and, if appropriate, focal spot size. Selects and sets a control corresponding to the field size (as listed on technique chart for phototiming). May select and set a kVp range button (if called for with equipment) corresponding to range for examination.
Sets a density selector corresponding to the usual (or special) requirements for the study. Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.

v) Depending on the equipment, may set controls to provide for use of bucky, manual adjustment of table and tube height, position, and of collimation, unless these have already been set.

15. Performer prepares patient for the final position ordered for the first (or next) exposure. Makes sure that correct side is being positioned when appropriate.

a. May explain or demonstrate to patient what is required. May obtain help in positioning.
b. Performer is careful to turn patient towards the enema tubing so as not to dislodge tip.
c. When positioning a patient with a balloon catheter in place, performer makes sure that the clamp is not lying over a part to be exposed or that patient is not lying on the clamp.
d. For frontal positions (AP or PA) performer adjusts patient's body

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so that its median sagittal plane is centered to the midline of table or film holder.

i) Has supine patient place arms in a comfortable position and supports ankles and knees.
ii) Has prone patient flex elbows, place arms in a comfortable position. Supports ankles. Rests patient's head on forehead and nose. May have patient rest hands beneath chest.

e. For lateral positioning has median sagittal plane parallel with midline. If recumbent, supports any elevated parts.
f. With all positions arranges shoulders to lie on a single transverse plane.
g. Performer centers part and keeps the long axis of the part parallel to the film holder. When using a bucky, centers patient to midline. With cassette on table top, centers film to part. With upright holder adjusts height of holder to part and centers part to film.

i) Performer may judge the point for centering based on the patient's type of body (habitus) and the evidence of the scout film. If both erect and recumbent positions are ordered, centers somewhat lower for erect positioning than for recumbent positions, allowing greater change for thin, asthenic patient.
ii) In centering to the level of the iliac crests performer makes sure not to use visual points of muscle or fatty tissue and palpates for the crest of the bone.

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h. Notes any orders for rotation of body, angulation of table or central ray.

16. Performer positions as follows depending on orders:

    a. For standard supine AP projection (posterior view) of large intestine, performer decides whether to use a single cassette or whether two cassettes placed crosswise will be required (for wide patient):

        i) Centers two cassettes so that the first is high enough to include the splenic flexure and the second is low enough to include the rectum.
        ii) Centers a single cassette at the level of the iliac crests, somewhat higher for hypersthenic (large, obese) patients and somewhat lower for asthenic (thin) patients).
        iii) For a localized view of the rectum and rectosigmoid junction, centers at the level of the upper border of the pubic symphysis.
        iv) Directs central ray at right angles to midpoint of film.
        v) If two exposures are to be made, performer has patient hold position for second exposure.

    b. For erect or prone PA projection (anterior view) of large intestine, performer positions patient in prone or standing position facing film holder:

        i) For erect position, has patient stand facing erect vertical cassette holder or table, centered to the midline, and with weight equally distributed. Has patient extend arms along sides of holder and grasp edges. Centers cassette just below the level of the iliac crests adjusting for body type. Includes the splenic flexure.
        ii) For prone position supports ankles. Has patient rest head on chin. Centers film as described above but somewhat higher to account for body type and shift in centering from erect to recumbent position.
        iii) Directs central ray at right angles to midpoint of film.

    c. For Trendelenburg views of overlapping loops of the large bowel, performer positions patient in the supine position or rotated slightly as ordered. Tilts head end of table down 30° to 40°. Centers film to the area of interest or at the level of the iliac crests. Directs central ray at right angles to midpoint of film.

    d. For a lateral projection of rectum and rectosigmoid, performer notes which side of the patient's body is to be next to film holder, and has patient lie on that side in a lateral recumbent position. Has patient flex knees comfortably.

        i) Centers the coronal plane passing about 2 inches behind the midaxillary line of body to the midline.
        ii) Places supports under and between knees and ankles. Has patient flex elbows, place lower hand under head, and has patient grasp side of table with opposite hand.
        iii) Centers film about two inches above the level of the pubic symphysis.

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iv) Directs central ray at right angles to midpoint of film. v) For patients who cannot assume lateral recumbent position, performer adjusts patient in semierect position by starting with supine position. Attaches footrest to end of table and secures patient. With patient on table, performer moves it to almost vertical position. Centers cassette in vertical film holder on right or left side of patient (depending on the side of interest). Directs central ray horizontally at right angles to the midpoint of the film, regardless of the angulation of the table. e. For AP projections (posterior views) to demonstrate selected intestinal areas, performer notes prescribed central ray angulation. i) Positions patient in supine position as described above. ii) For rectosigmoid and sigmoid areas, centers film at the level of the anterior superior iliac spines. Directs central ray at 35° to 45° cephalad to midpoint of film. iii) For rectosigmoid area, centers film to a point about 1 inch above the upper border of the pubic symphysis. Directs central ray at 12° caudad to midpoint of film. f. For oblique projections of intestine,notes whether anterior oblique projections are ordered or posterior oblique projections,and the side of interest; notes whether bilateral views are ordered. Performer may substitute right PA oblique	projection for left AP oblique projection and/or left PA oblique projection for right AP oblique projection as appropriate to the patient's condition. i) For anterior (AP) oblique projections (posterior oblique views) performer starts with patient in supine position. ii) For a left AP oblique projection of the rectosigmoid junction and the sigmoid, rotates the supine body 30° to 35° and supports the elevated (right) side. Centers to a point at the level of the anterior superior iliac spines. Directs central ray at 30° to 35° cephalad or as ordered. iii) For a left AP oblique projection of the hepatic flexure and adjacent portions of the proximal colon, performer positions and centers as in (ii), above, but rotates the body 45° and directs the central ray at right angles to midpoint of film. iv) For a right AP oblique projection of the splenic flexure and the adjacent transverse and descending portions of the colon, performer rotates the supine body 45° and supports the elevated (left) side. Centers to a point at the level of the anterior superior iliac spines. Directs central ray at right angles to midpoint of film. v) For posterior (PA) oblique projections (anterior oblique views) performer starts with patient in prone position.

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vi) For a right PA oblique projection of the hepatic flexure and adjacent portions of the colon, performer positions prone patient with head resting on right cheek and right arm alongside body. Rotates body so that left side is elevated 45°. Has patient support himself or herself on left forearm and flexed knee. Centers patient so that a longitudinal plane halfway between the spinal column and the anterior left surface is at the midline. Centers to the level of the iliac crest. Performer directs central ray at right angles to midpoint of film.

vii) For a left PA oblique projection of the splenic flexure and the left sided portions of the colon, performer positions as in (vi), above, but rotates to opposite side so that right side is elevated 45°. Centers film to the anterior right surface at the level of the iliac crest.

g. Performer rehearses patient in breath control such as breathing in deeply, breathing out, and holding breath (suspended exhalation) when ordered. Reinforces encouragement to retain enema.

17. Throughout procedure performer remains alert for any symptom of severe pain or adverse reaction, especially to contrast. As soon as performer judges that reaction may be severe, ceases exposure and notifies radiologist or attending physician at once.

18. Performer sets up for exposure after positioning patient:

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a. Performer sets and checks the focal-film distance if not already done, as appropriate. Checks by reading indicator scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.

b. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size. Uses cross-hair shadows as reference for center of field. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired.

c. Once the patient has been positioned and immobilized, performer adjusts the collimator. Either collimates so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). For small fields performer attaches an auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the area(s) of interest.

d. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that proper protective shielding has been provided to patient and everyone who will remain in room during exposure.

e. When everything is ready for the exposure, performer reminds patient of the cooperation and breath control to be used for

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exposure. Observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

f. Performer returns to control room. Makes sure controls are properly set, that equipment is set for radiography mode, and that patient is still in position.

g. Calls or uses intercom to remind patient of breathing instructions as rehearsed and to retain enema.

19. Performer makes exposure after the patient has been instructed to breathe out and hold unless otherwise ordered. Performer initiates exposure by pressing hand trigger or exposure control button.

a. While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.

b. May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.

c. With phototimer notes whether backup timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure.

d. After exposure is completed tells patient that he or she can relax but retain enema. If two cassettes are being used for a given projection has patient maintain position while performer centers tube for second exposure.

e. If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

f. After exposure removes cassette and removes markers for further use.

g. Repeats radiography for all the exposures ordered by radiologist, adjusting technical factors, tube, table, and/or position of patient or film holder as appropriate to each view ordered Repeats identification, collimation, shielding, orders for breath control, and exposure as above.

20. Performer arranges to have spot films and overheads processed at once:

a. May sign or have radiologist sign requisition sheet.

b. Checks that equipment is turned off.

c. With cassette spot films and overhead exposures removes any markers for further use. Attaches ID card for use with flasher if appropriate.

d. With spot film camera, performer advances the film so that all exposures made will be wound on the take-up spool in the roll film cassette. Replaces dark slide on camera lens. Uses device to cut film and create a light shield. Resets counter and removes film cassette.

e. Performer arranges to have overheads and spot films processed at once if appropriate or decides to process personally.

f. While films are being processed, makes sure that patient retains enema, is comfortable and, if necessary, attended by radiologist, staff member, or self. May arrange to have enema repeated if patient cannot retain enema.

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21. When the overheads and spot films have been processed and returned, performer places on view boxes. May also hang scout and prior films. Informs radiologist that radiograph(s) are ready for viewing.

    a. Performer makes note of radiologist's decisions regarding adequacy of the radiographs:

        i) If the radiologist indicates that there is any problem with the technical factors or the patient positioning for overheads, performer records or notes for use in "retakes." Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes." If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member. If request for retakes reflects the preference for density or contrast of the radiologist, performer notes for future use to avoid future "retakes."
        ii) If radiologist requires additional views with barium retained, performer repeats overhead filming as appropriate to new projections, as described above.
        iii) For further overhead exposures performer repeats appropriate steps including identification of cassette, use of R-L markers, selection and setting of technique, positioning patient and equipment for focus-object-film alignment, collimation, shielding, breathing instructions, making exposure, and processing, as described above.

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        iv) Performer refrains from commenting on the films or providing any interpretation to patient.
        vi) Performer shows subsequent sets of radiographs to radiologist as processed, and proceeds as described above until radiologist indicates that this stage of examination is completed.

    b. When radiologist indicates that radiography with enema retained is completed, performer notes orders for evacuation, post-evacuation radiographs and whether a double contrast study will follow with instillation of air. If appropriate, has radiologist fill out or sign requisition order.

22. Performer returns to patient and explains what will happen next. Indicates that patient can now expell the enema and that post-evacuation film and air contrast enema (if ordered) will follow.

    a. If the enema apparatus involves a closed system disposable kit, performer lowers enema bag from pole and instructs patient to release the enema back into the lowered bag. When this is done and patient feels that enema is expelled, performer leaves bag hung in position below the level of the table if air contrast study may follow. Otherwise removes and discards as discussed below.
    b. If the enema apparatus involves a retention balloon catheter, performer opens balloon lumen and allows air or water to drain. Uses paper toweling and gently removes the enema tip.

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i) Assists patient to descend from table and walk to toilet, or provides bedpan for patient to expel enema.

ii) Performer checks with any patient in toilet to make sure he or she is all right.

c. For patient with colostomy, performer lowers bag from pole and assists patient to sit on table, lean forward, and drain the barium mixture through the tubing into basin. May assist by massaging patient.

d. Performer cleans patient and any soiled equipment using sanitary technique. Provides patient with appropriate towels, cleansing solutions and fresh gown as appropriate. Replaces covering on table.

23. Performer proceeds to take post-evacuation radiographs as ordered:

a. Takes any projections ordered as described above, but decreases exposure factors to reflect decrease in frontal thickness of abdomen.

b. Is careful not to dislodge rectal tip if left in place for later air contrast.

c. If order is for an axial projection of the rectum, rectosigmoid junction and sigmoid, performer has patient sit on side or end or table so that posterior surface of each knee is in contact with edge of table.

i) Centers median sagittal plane of body to midline of table so that transverse axis of film coincides as nearly as possible to midaxillary plane of the body.

ii) Centers film to median sagittal plane of pelvis.

iii) May support feet with bench or stool. Has patient abduct thighs and lean directly forward until symphysis pubis is in close contact with table. May assist obese patient to achieve as close to a 45° angle of vertical axis of pelvis as possible. Has patient grasp ankles to maintain position.

iv) Directs central ray at right angles to film, centered to the lumbosacral region at the level of the greater trochanters. If flexion is restricted, directs central ray anteriorly at right angles to the coronal plane of the symphysis pubis.

d. Performer has post-evacuation radiographs processed and presented for radiologist's review as described above.

i) If so ordered, performer arranges to have patient given hot tea or coffee to stimulate further evacuation. Assists patient to evacuate again and continues as ordered until radiologist indicates that post-evacuation radiography is completed.

ii) Notes radiologist's orders for air contrast enema with fluoroscopy and overhead filming. Provides any materials needed.

24. Performer assists radiologist with air contrast enema as ordered:

a. Performer explains to patient what will happen.

b. If a disposable enema kit is being used and rectal tube is still in place, performer inverts the enema bag which is hung below the level of the table so that air will automatically rise.

c. If the enema tip has been removed, performer may prepare balloon catheter and air syringe and

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attach rectal tip and clamp or have this done. May insert tip into patient's rectum as described above.

- d. Performer assists while radiologist injects air through insufflater (or by squeezing inverted bag) while checking on TV monitor.
- e. Performer assists with fluoroscope controls, patient positioning, tilt table and/or changing of spot film cassettes, as described above, as ordered.

25. Performer makes overhead films as ordered with air enema retained, as described above. Adjusts technical factors to account for air contrast (decreased techniques from those used for barium enema). Has double contrast overheads processed and reviewed as above, and repeats with enema retained until radiologist indicates that radiography is completed.

26. When radiography has been completed, performer assists in termination procedures:

- a. Washes hands and dons gloves. Removes any markers from patient's body.
- b. With disposable kit, has patient expel air into bag:

  - i) Performer gently removes rectal tip.
  - ii) Wraps apparatus in paper, drains contents into a toilet, and discards in appropriate receptacle.
  - iii) Removes gloves and washes hands.

- c. With conventional equipment, performer uses paper toweling and gently removes enema tip. Assists patient to toilet or supplies bedpan. Checks with patient to be sure he or she is all right.

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  - i) Empties bedpan contents into toilet. Performer removes any fecal masses from rectal tube with paper toweling. Discards in appropriate receptacle.
  - ii) Rinses equipment and places for sterilizing or decides to do personally.
  - iii) Removes gloves and washes hands.

- d. With colostomy patient performer may leave catheter in place and have patient go to lavatory and empty enema bag. Performer supplies clean pad or arranges to have clean dressings supplied or applied after patient or MD removes catheter. Removes gloves and washes hands.
- e. May decide to assist patient from table. Makes sure patient is reminded of any footrest in stepping off table. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise from stool or table, and assists patient.
- f. Performer has patient cleansed; may have room and equipment cleaned with disinfectant. Has any other appropriate clean up procedures followed to avoid infection or contamination, or decides to do personally, depending on institutional arrangements.
- g. If not contraindicated, may reinforce instructions to patient on use of saline or water to help eliminate contrast medium. Reinforces information on when patient can eat (unless GI series is to follow).
- h. Performer may have patient transported to next assigned location, or decides to do personally, as

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appropriate. If appropriate, makes sure that patient is in the care of a staff person who will transport to appropriate next location or, if out-patient, will arrange to discharge or send patient home with escort as appropriate. i. Performer records the examination according to institutional procedures. May include date, room, examination type, the overhead views taken, the technical factors used, and film sizes. May record the number of exposures made of each spot film and overhead view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. Signs requisition sheet. j. Performer may record the fluoroscopic examination including exposure time and rad dosage. k. May present requisition form to radiologist for comments and signature. l. Performer may decide to jacket radiographs, requisition sheets, and related materials, and/or have information recorded in log book personally, or have this done, depending on institutional procedures. m. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

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1. **What is the output of this task?** (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured;abdomen measured; films identified;technical factors selected and set for fluoroscopy,spot filming,overheads;scouts taken;radiologist assisted with positioning,fluoroscopy;cholecystograms taken as ordered,processed, presented;fatty meal arranged;post-fatty meal cholangiogram series,post-evacuation films taken as ordered;pt. returned;examination recorded;radiographs placed for use.

2. **What is used in performing this task?** (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, medical-technical history,prior radiographs;phone; view boxes;pen;x-ray generator,control panels,tube, bucky,table,collimator;fluoroscopy unit,image intensifier,spot film device,TV monitor;cassettes;roll film;ID,R-L,series,respiration markers;compression band,inflated bag;marking pen;extension cones;stool; calipers;vertical cassette holder;lead aprons, shielding;immobilization devices;technique,standard view,tube rating and rad exposure charts;forms;phantom or test object;wheelchair;intercom;instruction sheet;contrast pills or capsules

3. **Is there a recipient, respondent or co-worker involved in the task?** Yes...(X) No...( )

4. **If "Yes" to q. 3:** Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-infant patient to have oral cholegraphy;radiologist;co-workers;accompanying adult;nurse

5. **Name the task** so that the answers to questions 1-4 are reflected. Underline essential words.

Taking oral cholecystograms and cholangiograms of non-infant pt., by reviewing request;preparing, instructing and reassuring pt.;measuring abdomen; setting up for fluoroscopy,spot filming;taking scout films as ordered;setting technical factors;identifying films;providing shielding;assisting in positioning of pt.,fluoroscopy,spot filming;taking overhead cholecystograms as ordered;arranging for processing; arranging for fatty meal;taking post-meal,post-evacuation cholangiograms as ordered;having pt. returned;placing radiographs for use;recording.

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Performer receives or obtains the x-ray requisition form,patient identification card, and any appropriate medical-technical history for a non-infant patient scheduled for oral cholegraphy (radiographic study of the gallbladder (cholecystography) and/or biliary ducts (cholangiography) after oral ingestion of a contrast medium in tablet or capsule form) as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.

Requisition may be for an initial study or may be for a "second day" study after initial use of contrast did not result in proper visualization of gallbladder and additional contrast was ordered. Performer may also receive prior scout film(s) from initial study with record of technical factors used and/or any changes necessary.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided:

   a. Performer checks the examination called for and the purpose. Notes

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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whether routine scout film(s) are ordered and/or any special requests, positions, or views.

b. Notes the name of the radiologist in charge; may note the name of the referring clinician.

c. Performer reads patient's name, identification number, sex, age, weight, and height. Notes whether patient is in-patient or out-patient. Notes any special information or note on known pathology that could affect patient positioning, technique, or handling, or may be contraindications (such as absence of gallbladder, acute abdominal or gastrointestinal symptoms). Notes whether patient will be in a wheelchair.

d. Notes whether erect and/or recumbent positioning is called for, breathing instructions, whether compression devices will be required, type of shielding needed.

e. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter, colostomy, or similar device in place; notes whether patient will be accompanied by nurse or other staff person, whether there are orders for removal of dressings from the abdominal area.

f. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete:

   i) Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether there is history of extensive radiography to bring to radiologist's notice.

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   ii) Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

   iii) Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.

g. Performer notes orders for prior preparation of patient such as discontinuance of particular medication, preliminary diet, timing of ingestion of contrast, abstinence from food and drink, use of cleansing enemas. May note whether these have been carried out. May arrange to have omitted steps carried out with delay in examination if appropriate.

h. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer brings this to attention of radiologist in charge. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

i. If prior radiographs already on file are to be presented to radiologist with scout films, and

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if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. Performer goes to appropriate room for the type of examination involved and the equipment required, or notes room assigned on requisition sheet. Prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Washes hands as appropriate.
   b. Checks that procedure tray has been prepared for the study involved or decides to do personally; checks that emergency cart is present or available.
   c. May make sure that x-ray tube has a fractional focal spot of appropriate size.
   d. Checks that proper accessories are available for procedure including leaded rubber shielding, aprons, and gloves to be used by performer, radiologist, the patient, and/or anyone who will remain in the room during exposure.
   e. Checks that appropriate immobilization devices are present, such as compression band and air-filled compression bag, that there is a mattress, pads, pillows and/or blankets for comfort of patient. May set up footboard at end of tilt-table and attach compression devices.
   f. Makes sure that right (R) and left (L) markers are available for use, identification cards, leaded numerals or markers, marker to indicate films exposed on inhalation if so ordered, and markers to number series films.
   g. For overhead filming performer makes sure that an adequate supply of loaded cassettes and appropriate cassette holders are available in the examination room. Selects appropriate speed and type of film, grid and cassette combination based on standard institutional practices. Selects size based on patient's size and area of interest. If adequate supply is not in room, arranges to obtain or decides to obtain personally.
   h. Performer prepares for identification of overhead films using equipment provided by institution:

      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information and time elapse for serial exposures.
      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
      iii) Checks identification against requisition sheet.

   i. If examination may include spot filming using a camera (attached to image intensifier) and roll film, performer checks film supply indicator to make sure that there is sufficient film in the roll film cassette.

      i) If there is insufficient roll film in camera, performer arranges to have roll film cassette loaded, or decides to do personally.

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ii) When loaded roll film cassette is obtained, performer checks loading in subdued light. Checks that end of film is cut correctly and is properly threaded and attached to take-up spool so that film unwinds appropriately. Checks that film is properly engaged in sprockets. Locks into operating position. If appropriate, cuts off excess film at exit port and removes. Attaches film cassette to camera and locks into place. Replaces camera cover.

iii) If there is an adequate film supply, checks that film is properly loaded.

iv) Performer advances film to compensate for any exposure of film due to installation or check.

v) Removes dark slide from camera lens.

vi) If not already done, performer writes or types a card with patient's identification information for use with spot film device. Inserts in slot in spot film camera as appropriate.

j. If examination may include spot filming using a cassette/bucky spot film device, performer checks that there is an adequate supply of appropriate size cassettes in room.

i) If there is insufficient supply of cassettes, arranges to obtain or decides to obtain personally.

ii) Performer carries out identification of the spot film cassettes as for overhead films.

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iii) Performer may use controls or manually pull out spot film bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Moves cassette into appropriate "stored" position.

iv) If R-L markers are to be used with spot filming, performer tapes into place on image intensifier screen or plans to tape to patient's body.

k. If a grid will be used with the image intensifier for fluoroscopy and/or spot filming, performer positions and centers grid if not already done. May use control button or slides grid into position. May check that the grid is oriented toward the x-ray tube, with grid lines parallel to the long axis of the tube.

3. Performer reviews and sets technical exposure factors for fluoroscopy and spot filming based on standard set by the institution as appropriate for the examination:

a. Dons protective leaded rubber garments such as apron and gloves.

b. Makes sure that no one is in examination room or control room.

c. Performer reviews the technique chart(s) for the unit(s) to be used:

i) Locates information for the projections involved. Takes note of the exposure factors to be used for overheads and fluoroscopy. Considers preferences of the radiologist involved and presence of contrast in biliary tract.

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ii) Notes any newly posted changes in technical factors (to reflect accommodation to a change in machine output or a policy decision).

iii) Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

d. Performer makes sure that indicator light shows that x-ray generator is "warmed up" and ready for use. Makes sure that all circuits have been stabilized. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.

e. As appropriate, performer sets x-ray generator mode selector(s) for overhead scout films, for later use of fluoroscopic mode, and use of spot film camera or cassette device.

f. Performer sets controls on image intensifier for spot film camera or cassette device:

i) For spot film camera, performer selects and sets the rate (frames per second) for the camera according to standards set for examination.

ii) For cassette spot filming performer may select and set a standard spot film program providing for format combinations such as single, half, or quarter combinations on a single cassette and related spot film sizes. Selects program appropriate for examination or awaits orders from radiologist.

g. If not already done, performer connects TV monitor to power outlet. Turns on monitor and checks that "ready" light is on.

h. If appropriate, performer selects the proper field size selector (if there is dual image intensifier).

i. Performer selects and sets exposure factors for fluoroscopy:

i) Selects and sets the kVp at standard setting for the examination. May check indicator dial. With automatic density control, sets density selector as appropriate for examination.

ii) If mA is automatically controlled according to patient thickness, performer turns fluoroscope mA selector to maximum standard position. If not automatically controlled, sets as appropriate for focal spot size and examination.

iii) Sets fluoroscopic examination timer to maximum position.

j. If appropriate, performer selects and sets exposure factors for spot filming:

i) For conventional manual exposure control, performer selects and sets the appropriate spot film time for the examination.

ii) For automatic, phototimed exposure control, performer selects a density exposure control appropriate for the examination.

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iii) Performer selects the appropriate mA for the examination and the focal spot size to be used.

iv) Performer selects and sets kVp by combining settings on one major and one minor kVp selector as appropriate for the examination.

4. If not already done, performer returns to examination room to set up x-ray and fluoroscope tube(s), image intensifier, collimator and accessories as appropriate for check of equipment prior to examination:

   a. Makes sure that no one is in room.
   b. Places phantom or appropriate test object on radiography table where patient's area of interest will be centered for examination.
   c. Adjusts fluoroscopic tube stand (above or below table) so that tube is at zero degrees and centered to the area of interest.
   d. If not already done, moves image intensifier and any spot film device into position; centers (over or under) the area of interest.
   e. Performer adjusts the x-ray tube to appropriate focal spot-object distance (target to object distance, TOD). For fluoroscopy adjusts distance between focal spot and image intensifier (focal spot to film distance, FFD). Makes sure that TOD is 15 inches or more. Operates controls or manually moves the x-ray tube(s) into place. Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD is obtained.
   f. Performer collimates fluoroscopy tube (and x-ray tube used for spot filming if different), depending on nature of the equipment and controls:

      i) Adjusts fluoroscopy beam shutters to the field size anticipated for fluoroscopic examination or sets shutter mode selector to automatic collimation.
      ii) Manually sets collimator for the spot film field size to be used, or selects and sets field size control to be used for automatic collimation with programmed spot film cassette exposure sequence.

5. If not already done, performer checks functioning of fluoroscopy equipment by entering remote control room or operating controls in examination room behind leaded screen:

   a. To check fluoroscopy mode, performer turns on TV power switch controls as appropriate. Activates fluoroscope exposure by pressing footswitch or as appropriate. Views test object being fluoroscoped on TV monitor.

      i) Performer adjusts kVp control (and mA control if appropriate) and observes effects on TV monitor to be sure that equipment is operating properly.
      ii) Checks mA meter and notes whether appropriate reading is obtained.
      iii) Performer checks that TV brightness controls are operating and adjusts for preliminary viewing.
      iv) Checks examination timer by noting whether time elapse indicator moves during exposure showing decreasing time left for examination. May check

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that exposure is terminated when maximum examination exposure time is reached.

b. To check spot film functioning, performer may move cassette or roll film into x-ray exposure field using appropriate controls.

   i) Performer activates controls for spot film exposure. Notes whether cassette or roll film transport is operating appropriately. Notes whether exposure is terminated by phototimer or, if manual timer, in time set. If appropriate, releases spot film control after exposure.

   ii) If equipment is operating appropriately, performer unloads cassette and reloads or advances roll film as appropriate. Moves bucky out of way until fluoroscopy is completed.

c. After equipment has been checked, performer shuts and resets for standard exposure factors. If performer decides that any of the equipment is not functioning properly, performer informs appropriate staff member. Arranges for alternate unit to be used.

6. Performer readies patient for the examination:

   a. Performer washes hands as appropriate. Depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.

   b. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

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   c. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

   d. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

   e. Performer has patient assume a comfortable recumbent or seated position, as appropriate.

      i) If appropriate, places mattress, pillow or clean linen on x-ray table. May place pad, blanket or pillow under bony prominences to provide comfort for recumbent patient.

      ii) If patient is in wheelchair may move patient in chair into position next to table. Makes sure that wheelchair is in locked position.

      iii) Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way that may be collided with by patient.

      iv) If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.

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f. If not already done, has patient's clothing removed and provides gown or drape. May assist patient or request assistance from nurse. Permits patient to keep covered with gown until measurements are taken and until exposure. Treats young patient with as much courtesy as adult.

g. Performer questions patient or accompanying adult about preparatory procedures to check that patient has followed them correctly and to find out about patient's reaction to contrast:

  i) Performer questions patient on whether any listed orders on cessation of a particular medication, use of preliminary diet, or the time that the contrast was to be injected were carried out, and about orders for abstinence from food and drink after taking contrast. Checks that any orders for cleansing enema(s) were carried out.

  ii) Performer questions patient or accompanying adult on any reaction to the contrast such as vomiting and/or diarrhea and on when this occurred.

  iii) Performer notes any unusual or severe reaction, and reports this or any failure of patient to carry out preparatory routine to radiologist. Follows out any orders to postpone examination. Continues with examination as ordered.

h. Performer evaluates the patient's bodily habitus to estimate the position of the gallbladder and variations in location between inhalation and exhalation for centering. Notes whether the areas of interest are heavily covered by muscle or soft fat, whether the palpation points will be easy to find. Notes whether the extremities are of unequal length. For female patients, performer judges whether the breasts are large and pendulous. If so, may plan to have patient or staff member draw the breasts to the sides and upwards and hold in place with wide bandage.

i. If patient has a wound, colostomy, or ileostomy with dressing to be removed, performer checks whether zinc or iodoform paste or radiopaque gauze is being used. If so, has appropriate staff member remove dressing or tube or decides to do personally (if appropriate). Checks that radiopaque paste or guaze is completely removed.

j. If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy. If there is any possibility that patient is pregnant and this has not already been recorded, performer informs radiologist and proceeds only with approval.

7. Performer explains to patient what will be involved in the procedure and continues to prepare:

  a. Performer explains the purpose of the preliminary procedures and what will be involved in the examination:

    i) Performer indicates the need to visualize the gallbladder and explains use of scouts, fluoroscopy, and overhead filming. Gives indication of variations in amount of time that may be involved.

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ii) Explains probable use of fatty meal, post-fatty meal and post evacuation films and likely time intervals.

b. Performer explains what cooperation will be asked of patient. Describes what the radiologist will be doing. Indicates what types of positions the patient will be asked to assume. Describes any probable breathing control, use of compression devices, as appropriate. May demonstrate how tilt table will be used and reassure patient that he or she will be held safely.

c. Performer encourages patient to relax. Rehearses patient in suspending respiration (inhalation or exhalation) and relaxing. Performer may check patient's relaxation by keeping hand on patient's back to detect tenseness. Performer may judge time interval needed after cessation of respiration for patient to relax and plans to adjust exposure timing accordingly.

d. Performer answers patient's nonmedical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains, when asked medical questions, that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

e. Unless measurements have already been made, performer uses centimeter calipers to measure the thickness of the abdomen in the directions in which the central ray of the x-ray beam will pass through the centered part from tube to film. If both recumbent and erect positioning will be used, performer may measure or estimates thickness in both positions. Records for use in determining exposure factors for overheads. After measuring, has patient rest in as relaxed a position as possible.

f. Performer may tape R or L marker to patient if appropriate for use in spot filming.

g. Performer obtains the appropriate size loaded cassette for the first scout projection and attaches identification information to the cassette:

i) Places right or left marker on film holder or table-top as appropriate or depresses appropriate R or L button for automatic marking.

ii) If patient's identification information is in the form of lead numerals or marker, performer places on appropriate corner of cassette.

iii) If patient identification information is to be entered by use of flasher, sets flash card aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.

iv) Performer may place patient's card into card tray for equipment using automatic film marking device.

v) If suspended inhalation (rather than exhalation) has been ordered, marks cassette to indicate this.

h. Performer places cassette in bucky. May manually pull out bucky tray and open retaining clamps. Inserts cassette into

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bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.

8. Performer selects and sets the exposure factors for the first (or next) scout projection by consulting the technique chart(s) posted for the machine:

   a. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured (erect or recumbent as appropriate) and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other radiographic accessories (such as screens, grids, bucky, etc.).
   b. Makes note of the kVp, mA, T (seconds of exposure time), focal spot size, and the focal film distance (TFD or FFD) called for.
   c. Once the standard kVp, mA and time have been determined, performer makes any conversions necessary to account for the use of contrast, extreme fat or muscularity, preference of the radiologist involved, and any posted changes. Performer looks up numerical conversion factors and calculates, or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate.
   d. Performer sets the exposure factors for the first (or next) scout projection:

      i) Enters control room and sets control for radiography mode.

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      ii) For conventional exposure control, performer sets the milliamperage selected for the correct focal spot size. Sets the selected exposure time that will produce the mAs desired. Sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.
      iii) For automatic phototimed exposure control, performer sets the category corresponding to the type of study and use of screens, bucky, etc., and, if appropriate, focal spot size. Sets a control corresponding to the selected field size (as listed on technique chart for phototiming).
      May set a kVp range button (if called for with equipment) corresponding to the appropriate range for the examination. Sets a density selector corresponding to the usual (or special) requirements for the study. Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.
      iv) Depending on the equipment, may set controls to provide for use of bucky, manual adjustment of table and tube height, position, and of collimation, unless these have already been set.

9. Performer prepares patient for positioning for first (or next) scout film(s). Selects prone PA or supine AP position for standard scout film of abdomen and/or right side of abdomen, and may make other special projections as ordered or as determined by standard institutional procedures for scouts:

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a. Performer may explain or demonstrate to patient what is required. May obtain help in positioning.

b. If patient has a urinary catheter in place, performer turns patient toward the catheter and tubing to prevent separating it from drainage bottle and breaking sterile system and to avoid causing pain.

c. When positioning a patient with a balloon catheter in place, performer makes sure that the clamp is not lying over a part to be exposed or that patient is not lying on the clamp.

d. If patient will be standing and limbs are of unequal length, performer provides support to shorter limb so as to evenly distribute weight.

e. Performer keeps the long axis of the part parallel to the cassette holder. With upright holder adjusts height of holder to part and centers part to film.

   i) Performer arranges patient's shoulders to lie on a single transverse plane.

   ii) Has prone patient flex elbows, place arms in a comfortable position. Supports ankles. Rests patient's head on forehead and nose. May have patient rest hands beneath chest.

   iii) Has supine patient place arms in a comfortable position and supports ankles and knees.

f. Performer judges the location of the gallbladder based on the patient's type of body (habitus) and the evidence of any prior scout films.
Performer plans to center higher for supine positioning and lower for prone and erect positioning.

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Centers higher for obese, hypersthenic patients and lower for thin, asthenic patients.

10. Performer positions as follows (or as described below for later steps) depending on the positions ordered for scout film(s).

   a. For a prone PA projection (anterior view) of the gallbladder, performer has the patient lie in a prone position on the table.

      i) Depending on whether an abdominal survey view or a right abdominal view is ordered, performer centers the median sagittal plane or the middle of the right side of abdomen to the midline of the table.

      ii) May have patient rest head on left cheek. Has patient flex right elbow and adjust arm in comfortable position with left arm alongside body. Elevates ankles. With thin patients may place pillow under head and position it so that upper chest is also supported. May place pad under iliac spines. If female patient has pendulous breasts, has her spread breasts upward and outward.

      iii) Performer centers film to the level of the estimated location of the gallbladder as determined by patient's body type and prior films, breath control to be used, and position of patient, or to center of abdominal area. May mark centering point on body for later adjustment.

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iv) Directs central ray at right angles to midpoint of film.

b. For a supine AP projection (posterior view) of the gallbladder, performer has the patient lie in a supine position on the table.

   i) Performer centers median sagittal plane or the center of the right side of abdomen to the midline of table.
   ii) Has patient flex elbows and abduct arms. For thin patients or if so ordered, performer rotates the body slightly with right side against table. Supports knees and immobilizes ankles.
   iii) Centers film to the level of the gallbladder as estimated, allowing for body type and position of patient. May mark centering point.
   iv) Directs central ray at right angles to midpoint of film.

c. Performer applies compression band and air filled bag if appropriate to upper abdominal region.
d. Checks whether patient is able to relax as positioned and immobilized. If not, performer readjusts and recenters until patient is comfortable.
e. Performer rehearses patient in suspended exhalation (or suspended inhalation if so ordered) until patient can hold suspended respiration and remain relaxed until told to breathe again.
f. Throughout procedure performer remains alert for any symptom of severe pain or adverse reaction. If performer judges that patient's discomfort is severe, ceases exposure and notifies radiologist or attending physician at once.

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11. Performer sets up for exposure after positioning patient:

   a. Performer sets the focal-film distance if not already done as appropriate. Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.
   b. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size. Uses cross-hair shadows as reference for center of field. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired.
   c. Performer adjusts the collimator so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). For small fields performer attaches an auxiliary extension cone to collimator to further reduce the primary beam. Adjusts primary beam to minimum size needed to cover the area(s) of interest.
   d. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest. Makes sure that proper protective shielding has been provided to patient and everyone who will remain in room during exposure. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

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e. When everything is ready for the exposure, performer reminds patient of the cooperation and breath control to be used for exposure. Encourages patient to relax. Observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

f. Performer returns to control room. Makes sure controls are properly set, that equipment is set for radiography mode, and that patient is still in position.

12. Performer makes exposure:

a. Calls or uses intercom to tell patient to carry out breathing instructions as rehearsed. Has patient breathe out and hold unless suspended inhalation has been ordered.

b. When respiration has been suspended, performer waits one or two seconds to allow involuntary movement of viscera to subside and then makes exposure or waits number of seconds judged necessary for patient to relax.

c. Performer initiates exposure by pressing hand trigger or exposure control button.

i) While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.

ii) May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.

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iii) With phototimer notes whether backup timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure.

iv) After exposure is completed tells patient that he or she can breathe.

v) If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

d. After exposure removes cassette and removes markers for further use.

e. Repeats radiography for all the scout films required. Adjusts technical factors, tube, and position of patient or film holder as appropriate to each view ordered. Repeats identification, collimation, shielding, orders for breath control and exposure as above.

13. The performer arranges to have the scout films processed at once or decides to do personally.

a. Attaches ID card for use with flasher if appropriate. May sign requisition.

b. While films are being processed and/or evaluated performer has patient relax in examination room or holding area. Explains what will happen next. If appropriate, makes sure that patient will be attended while waiting.

c. If appropriate, moves x-ray tube and any protruding film holder away from patient before patient

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rises and decides to assist patient from table. Makes sure patient is reminded of any footrest in stepping off table.

14. The performer brings the requisition sheet, the patient's medical history, chart, the processed scout film(s) and any prior films to radiologist. Displays radiographs on view boxes.

    a. If not already done, performer tells radiologist about any difficulties encountered with regard to information, possible contraindications, or anything else that should be brought to radiologist's attention. Notes any special orders or change in procedure decided by radiologist.
    b. Performer may accompany radiologist to examination room and introduce patient to radiologist or calls patient from holding area.

15. During radiologist's review of requisition, scouts, prior films and examination of patient, performer notes radiologist's decisions and orders:

    a. If radiologist indicates that procedure is to be terminated because gall stones are in evidence on scout(s) or (if second day study)if radiologist decides to proceed immediately to intravenous method, performer proceeds to termination steps as described below. If appropriate,arranges to have proper forms filled out and/or new requisition made out and signed.
    If scout film is judged adequate and no further examination is needed, performer proceeds to terminate as described below.
    b. If radiologist decides that the gallbladder is poorly visualized and that an additional dose of oral contrast and/or additional cleansing is needed, performer may arrange to reinforce instructions to patient for prior preparations for second day study and taking of additional contrast or may decide to do personally. May arrange to reschedule patient.
    c. If radiologist decides that fluoroscopy is necessary to provide more information on location and condition of gallbladder, performer notes radiologist's orders for program and settings for spot filming and proceeds to prepare for fluoroscopy (as described earlier).

        i) Discusses sequence and timing for procedure with radiologist. May arrange signals for exposure, changing of spot film cassettes, operation of exposure controls.
        ii) If required, changes or adjusts technical factors, program, and settings for fluoroscopy and spot filming.

    d. If radiologist indicates that the scout films do not provide enough information on location or condition of gallbladder, performer notes radiologist's orders for change in technical factors, patient positions, tube positions, and/or centering of film. Plans to make additional overheads, send for processing and present for review, one at a time, until radiologist indicates that gallbladder is properly visualized (as described below).
    e. If radiologist indicates that the scout film(s) are adequate, and if radiologist decides to

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proceed with fatty meal, post-fatty meal and post-evacuation fluoroscopy and/or overheads, performer notes radiologist's orders for the fatty meal, time sequence for meal, any fluoroscopy and overhead series, projections ordered, and positions of patient and central beam. If appropriate,has radiologist fill out or sign requisition orders for filming and meal.

16. If radiologist has decided to examine patient fluoroscopically, performer proceeds as follows:

    a. Performer washes hands as appropriate.
    b. Performer gives leaded gloves and apron to radiologist. If appropriate, places leaded curtain in place. Provides patient and everyone remaining in room during exposure with appropriate protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.
    c. On signal from radiologist, performer may dim room lights. Turns on TV power switch. May go to control room and operate fluoroscopy controls on orders from radiologist. Adjusts kVp and/or mA controls according to radiologist's orders.
    d. Performer may help radiologist to position patient in appropriate position. May operate tilt-table on orders from radiologist. May position pressure device(s) on orders.
    e. Performer may assist radiologist with spot filming:

        i) Operates exposure controls as ordered, or positions table, tube, or patient as ordered.
        ii) If spot film attachment uses cassettes, performer may unload as used, identify, and insert additional cassettes, as described above, throughout procedure.

    f. Depending on institutional procedures, performer may keep radiologist informed of cumulative exposure as shown on fluoroscope timer indicator.
    g. When the radiologist informs performer that the fluoroscopic portion of the examination is over, performer notes orders for any pre-fatty meal overhead filming and/or orders for fatty meal and post-fatty meal radiography.

        i) Notes particular areas of interest, special positions, breathing instructions.
        ii) May note whether radiologist has marked location of gallbladder for use in centering. If so, notes whether this was with patient in erect, prone, or supine position.
        iii) May discuss with radiologist any special precautions needed in patient positioning, to avoid injuring patient.

17. If radiologist has ordered additional overheads for localization and/or visualization of the gallbladder, performer proceeds as for scout films, as described above, except as follows:

    a. Performer acts on radiologist's orders for changes in technical factors,and converts as appropriate when setting factors for each radiograph.
    b. If radiologist has used fluoroscopy, performer may note centering

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mark made by physician. When centering, takes account of patient's position when centering mark was made (erect, supine, prone) and adjusts centering to account for shift to any different current position. Wipes away any inappropriate centering marks made for scouts.

c. Performer repeats as appropriate the steps for setting exposure factors, identifying cassette, placing in bucky, explaining to patient, and positioning patient, film, and tube, as described, except as noted below.

d. When positioning patient in erect or decubitus position, performer may have patient maintain the position and relax for several minutes to allow any small gallstones to come to rest. Makes sure grid lines are at right angles to the floor.

e. For an erect PA projection (anterior view) of the gallbladder, performer has patient stand facing vertical cassette holder or bucky in PA position with weight evenly distributed.

  i) Centers film in bucky to the marked location (adjusted for shift from position when marked) or centers film to estimated center of gallbladder.
  ii) May have patient extend arms along sides of holder and grasp edges.
  iii) Applies compression band and/or bag if appropriate. Performer makes sure that patient is maintained in erect position long enough before exposure for small gallstones to be accurately demonstrated.
  iv) Directs central ray at right angles to center of film.

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f. For right lateral decubitus positioning for projections of the gallbladder, performer uses a vertical bucky or cassette holder with patient lying on table. Notes whether PA or AP projection is required for frontal view.

  i) Has patient lie on right side. Has patient flex knees comfortably. Places supports under and between knees and ankles. Has patient flex elbows, place lower hand under head, and has patient grasp side of table with opposite hand. Elevates the torso. May apply compression. Supports in position.
  ii) For frontal projection places film vertically and directs x-ray tube horizontally. Places film behind patient and tube in front for AP projection; the reverse for PA projection. Directs central ray horizontally at right angles to midpoint of film.
  iii) For a lateral view centers cassette in bucky in table and directs central ray vertically at right angles to center of film.
  iv) Centers film to marked centering point (adjusted) or to estimated location of gallbladder, allowing for likely drop in location in this position towards the midaxillary line.
  v) Allows patient to maintain position long enough before exposure for small gallstones to be accurately demonstrated.

g. For a left PA oblique projection (left anterior oblique view) of gallbladder, performer notes the degrees of rotation required, the number of oblique views ordered,

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and the change in rotation between exposures. Marks cassettes to show order in series.

i) Performer positions patient in the prone position with head resting on left cheek and left arm alongside body. Rotates body so that right side is elevated. Has patient support himself or herself on right forearm and flexed knee and adjusts rotation to the desired degree.
ii) Centers patient so that previously localized or estimated location of the gallbladder is at the midline. Centers film at the marked or estimated level of the gallbladder adjusted for position.
iii) Applies inflated bag or radiolucent wedge under abdomen.
iv) Directs central ray at right angles to midpoint of film.
v) Rehearses patient in suspending breathing at end of exhalation for exposure unless otherwise ordered, and remaining in position until directed to change rotation for next exposure in series.

h. For PA lordotic projection (anterior view) of the gallbladder, performer uses upright cassette holder or bucky.

i) Performer has patient stand or sit in PA position before upright cassette holder with right side of abdomen centered to midline.
ii) Has patient grasp sides of stand or table, brace abdomen against it, and lean backward as much as possible or with thorax at a 45° angle.

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iii) Centers film to the estimated level of the gallbladder.
iv) Directs central ray horizontally at right angles to midpoint of film.

i. If gallbladder location has not yet been determined, performer may mark the centering point being used on patient's body.
j. Performer again checks for ability of patient to relax and repeats appropriate breathing instructions. Repeats appropriate collimation. Provides shielding and makes exposure as described above.

18. Performer arranges for processing and review of any spot films and each overhead view as taken:

a. May sign or have radiologist sign requisition sheet.
b. Checks that equipment is turned off.
c. With cassette spot films and overhead exposures, removes any markers for further use. Attaches ID card for use with flasher if appropriate.
d. With spot film camera, performer advances the film so that all exposures made will be wound on the take-up spool in the roll film cassette. Replaces dark slide on camera lens. Uses device to cut film and create a light shield. Resets counter and removes film cassette.
e. Performer has overheads and any spot films processed at once or decides to process personally.
f. While films are being processed, makes sure that patient is comfortable and, if necessary, attended by radiologist, staff member, or self.

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g. When the overheads and spot films have been processed and returned, performer places on view boxes. May also hang scout(s) and prior films. Informs radiologist that radiograph(s) are ready for viewing and makes note of radiologist's decisions:

- i) Notes orders for further overheads to locate gallbladder or provide better visualization.
- ii) If overhead has not localized gallbladder, performer removes trial centering mark until localization has been determined.
- iii) If the radiologist indicates that there is any problem with the technical factors or the patient positioning for overheads, performer records or notes for use in "retakes." Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes." If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member. If request for retakes reflects the preference for density or contrast of the radiologist, performer notes for future use to avoid future "retakes."
- iv) If radiologist requires additional centering and/or positions, performer repeats appropriate steps including identification of cassette, use of R-L and series markers, selection and setting of technique, positioning patient and equipment for focus-object-

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film alignment, collimation, shielding, breathing instructions, making exposure, and processing, as described above.
- v) Performer refrains from commenting on the films or providing any interpretation to patient.
- vi) Performer shows subsequent radiographs to radiologist as processed and proceeds as described above until radiologist indicates that this stage of examination is completed.

h. When radiologist indicates that pre-fatty meal radiography is completed, notes any orders for fatty meal, post-fatty meal and post-evacuation fluoroscopy and/or overheads.

19. If a fatty meal has been ordered, performer has radiologist's orders carried out and patient given meal or fed as appropriate. May decide to do personally.

a. If patient may leave the department for meal, performer makes sure that patient or accompanying adult knows exact time to return.

b. With in-patient, may arrange to have nursing staff in charge of patient's care informed. Performer may arrange to have patient taken to appropriate holding area. Keeps track of the time elapsed. If appropriate, makes sure that patient is in the care of a staff person who will transport to appropriate location and return patient at appropriate time.

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20. After patient has had fatty meal and/or after appropriate elapse of time, performer has patient returned and prepared (or prepares) as appropriate for fluoroscopy and/or overhead filming of extrahepatic ducts (cholangiography). Performer may have patient assume right AP oblique position at once and may maintain patient in position until series are completed.

21. If radiologist will use fluoroscopy, performer assists as described above; has spot films processed; displays when ready on view boxes.

22. If performer will take a series of post-fatty meal radiographs, proceeds as ordered and as described above except as follows:

    a. In series films performer makes sure to include time-interval marker on each cassette.
    b. Performer uses marked location of gallbladder on patient's body as reference for location of extrahepatic bile ducts. When centering takes account of patient's position when centering mark was made and adjusts as appropriate.
    c. For a right AP oblique projection (right posterior oblique view) of the extrahepatic bile ducts, performer plans series at appropriate intervals.

        i) Performer has patient assume supine position with the area of the gallbladder centered to the midline of the table. Elevates the left side of the body about 15° to 20°. Supports the elevated shoulder, hip and knee. Has patient extend hips and knees so that back is arched. May place arms in comfortable position with hands under or above head.
        ii) Centers film to estimated location of gallbladder and appropriately higher than for prone position.
        iii) Places inflated bag or radiolucent wedge under abdomen.
        iv) Directs central ray at right angles to midpoint of film.

    d. Performer provides collimation, shielding, instructions for breathing,and makes exposure as described above. Arranges to have each overhead processed as taken and reviewed by radiologist. Keeps track of timing and continues at regular intervals until radiologist indicates that opacification of ducts is optimal and series is completed.

23. If radiologist orders post-fatty meal, post-evacuation films,perform- notes the timing, projections, and patient positions ordered.

    a. Proceeds as appropriate as described above to make, process, and present post-fatty meal, post-evacuation radiographs.
    b. Notes any orders for delayed films. If so, performer may provide requisition sheet and have radiologist fill out and sign.

24. When performer is told by radiologist that the examination has been completed, performer carries out termination steps for the examination:

    a. If appropriate, arranges to have fresh colostomy and/or dressing applied (if removed for radiography). Has patient cleansed if appropriate. Removes any R-L mark-

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ers or centering marks from patient's body. b. May have patient transported back to holding area or next location, or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise. [illegible] If appropriate, makes sure that patient is in the care of a staff person who will transport to appropriate next location or, if outpatient, will arrange to discharge or send patient home (with escort if appropriate). d. May have room and equipment cleaned; has any other appropriate clean up procedures followed to avoid infection or contamination, or decides to do personally, depending on institutional procedures. e. Performer records the examination according to institutional procedures. May include date, room, examination type, the overhead views taken, the technical factors used, and film sizes. May record the number of exposures made of each spot film and overhead view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. Signs requisition sheet. f. Performer may record the fluoroscopy examination including exposure time and rad dosage. g. May present requisition form to radiologist for comments and signature. May present forms for requisitions for later delayed films and/or additional examination(s). h. Performer may decide to jacket radiographs, requisition sheets, and related materials, and/or have	information recorded in log book personally, or have this done, depending on institutional procedures. i. May indicate to appropriate staff person when the performer is ready to proceed with next examination.

TASK DESCRIPTION SHEET

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1. **What is the output of this task? (Be sure this is broad enough to be repeatable.)**

Requisition reviewed;pt. reassured,measured;scout taken;technical factors selected and set for cholangiograms,cholecystograms;radiologist assisted with test dose,infusion of contrast;postinjection cholangiograms,tomograms,cholecystograms taken as ordered, processed,presented;fatty meal arranged;post-fatty meal overheads taken as ordered;pt. returned;examination recorded;cholegrams placed for use.

2. **What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)**

Pt.'s x-ray requisition sheet,ID card,ID bracelet, medical-technical history,prior radiographs;phone; view boxes;pen;x-ray generator,control panels,tube, bucky,table,collimator;ID,R-L,series,breath control markers;compression band,inflated bag;marking pen; procedure tray with test dose,IV equipment,water soluble,iodine based contrast;emergency cart;clock; tomographic attachments;extension cones;stool;calipers;vertical holder;cassettes;lead apron,shielding; immobilization devices;technique,standard view,tube rating,cooling,and rad exposure charts;forms;intercom;stretcher;wheelchair

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. **If "Yes" to q. 3:** Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-infant pt. to have intravenous cholegraphy; radiologist;co-workers;accompanying adult;nurse

5. **Name the task so that the answers to questions 1-4 are reflected. Underline essential words.**

Taking intravenous cholangiograms and cholecystograms of non-infant pt. by reviewing request;preparing patient and equipment;measuring;taking scout; assisting with test dose and infusion of contrast; setting technical factors,identifying film,positioning pt.,providing shielding,collimating,teaching breathing;taking postinjection cholangiograms as ordered;arranging for processing;taking tomograms, cholecystograms,arranging for fatty meal and post-meal radiographs as ordered;having pt. returned; placing radiographs for use;recording.

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Performer receives or obtains the x-ray requisition form,patient identification card, and any appropriate medical-technical history for a non-infant patient scheduled for intravenous cholegraphy (radiographic study of the biliary ducts (cholangiography) and the gallbladder (cholecystography) after intravenous infusion of contrast medium) as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.
d. From co-worker.
e. Having arranged, after receiving orders, to proceed after nonvisualization of gallbladder by oral method.

Performer may also receive a scout film and/or prior cholegrams with record of technical factors used and/or any changes necessary.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided:

    a. Performer checks the examination called for and the purpose. Notes whether a routine scout film is ordered or any special requests.

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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b. Notes the name of the radiologist in charge; may note the name of the referring clinician.

c. Performer reads patient's name, identification number, sex, age, weight, and height. Notes whether patient is in-patient, out-patient, or emergency patient. Notes any special information or note on known pathology that could affect patient positioning, technique, or handling,such as absence of a gallbladder (cholecystectomized patient). Notes shielding needed.

d. Notes whether patient has already undergone oral cholegraphy. If so, proceeds directly to preparations for infusion omitting steps already carried out.

e. Notes whether patient has history of allergies, whether test dose of contrast is planned.

f. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter, colostomy, or similar device in place. Notes whether patient will be on a stretcher or in a wheelchair. Notes whether patient will be accompanied by nurse or other staff person, whether there are orders for removal of dressings from the abdominal area.

g. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete:

   i) Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure. Notices whether examination has been done elsewhere in recent past, whether there is history of extensive radiography to report to radiologist.

   ii) Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

   iii) Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.

h. Performer notes orders for prior preparation of patient such as preliminary diet, abstinence from food and drink, use of cleansing enemas. May note whether these have been recorded as carried out. If appropriate arranges to have any omitted steps carried out with delay in examination.

i. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer brings this to attention of radiologist in charge. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

j. If prior radiographs already on file are to be presented with scout film to radiologist and if not already with patient's jacketed material, performer arranges to have prior films delivered.

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2. Performer goes to appropriate room for the type of examination involved and the equipment required, or notes room assigned on requisition sheet. Prepares ahead so as not to keep patient in examination room longer than necessary:

   a. Washes hands as appropriate.
   b. Checks that procedure tray has been prepared for the study involved or decides to do personally. Checks that materials are present for infusion of contrast solution and for test dose. Makes sure emergency cart is present. Checks for emesis basin and towels.
   c. Performer makes sure that equipment has a tomography capability or that tomographic attachment is in room. Checks that x-ray tube has appropriately small fractional focal spot and that, if appropriate, additional filtration is available for tomography.
   d. Checks that proper accessories are available for procedure including leaded rubber shielding, aprons, to be used by the performer, the patient, and anyone who will remain in the room during exposure.
   e. Checks that appropriate immobilization devices are present, such as compression band and air-filled compression bag, that there is a mattress, pads, pillows and/or blankets for comfort of patient.
   f. Makes sure that right (R) and left (L) markers are available for use, identification cards, or leaded numerals or markers, and markers to indicate post-injection time intervals, post-fatty meal views, and any special positions or breath control.
   g. If appropriate, performer makes sure that contrast solution is at body temperature. May arrange to have it warmed or cooled.
   h. Performer makes sure that an adequate supply of loaded cassettes and appropriate cassette holders are available in the examination room. Selects appropriate speed and type of film, grid and cassette combination depending on the techniques to be used and standard institutional practices. Selects size based on patient's size and area of interest. If adequate supply is not in room, arranges to obtain or decides to obtain personally.
   i. Performer prepares for identification of overhead films using equipment provided by institution:

      i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information and time elapse for serial exposures.
      ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
      iii) Checks identification against requisition sheet.

   j. Performer reviews the technique chart for the machine to be used and takes note of any newly posted changes in technical factors (to reflect accommodation to a change in machine output or a policy decision).

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k. Performer checks that x-ray equipment is ready for use. Goes to control panel and checks that indicator light shows that machine is "warmed up," or turns on main switch as appropriate to equipment and allows time for the machine to "warm up." If appropriate, performer may set radiography mode selector and set collimator control for manual operation. Makes sure that all circuits have been stabilized.

l. Performer may note whether a preliminary scout film has already been made of the patient (done earlier or by another radiologic technologist).

  i) If a scout film has already been made and viewed by radiologist, performer notes the technique used or ordered and plans technical factors for overhead radiography, adjusting as appropriate.

  ii) If a scout film has been made but not approved, performer places processed scout film and any prior films with patient's chart or places on view boxes for review by radiologist.

  iii) If a scout film has not been made and is required before patient is seen by radiologist, performer plans to proceed after readying patient.

3. Performer readies patient for the examination.

  a. Performer washes hands as appropriate. Depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.

  b. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.

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  c. Depending on institutional procedures, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.

  d. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.

  e. Performer has patient assume a comfortable recumbent or seated position, as appropriate.

    i) If appropriate, places mattress, pillow or clean linen on x-ray table. May place pad, blanket or pillow under bony prominences to provide comfort for recumbent patient.

    ii) If patient is in wheelchair may move patient in chair into position next to table. Makes sure that wheelchair is in locked position.

    iii) Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way that may be collided with by patient.

    iv) If assisting patient to step on footstool in order to get on table, helps patient turn on stool, and then sit and/or lie on table.

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v) If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move or have patient moved to table.

f. If not already done, has patient's clothing removed and provides gown or drape. May assist patient or request assistance from nurse. Permits patient to keep covered with gown until measurements are taken and until exposure. Treats young patient with as much courtesy as adult.

g. If not already done, performer questions patient or accompanying adult about preparatory procedures.

i) Checks that any preliminary diet ordered was followed. Checks that any order for prior abstinence from food and drink was adhered to. Checks that any orders for cleansing enema(s) were carried out.

ii) If not already done, questions patient or accompanying adult about any allergies, especially to shellfish or adverse reactions to contrast medium (especially iodine based).

iii) If appropriate and not already done, performer questions female patient of child bearing age regarding possible pregnancy.

iv) If there is any possibility that patient is pregnant and this has not already been recorded, or that patient has sensitivity to contrast, or that patient has not abstained from food as ordered, performer informs radiologist at once and proceeds only with approval.

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h. If patient has a wound, colostomy, or ileostomy with dressing to be removed, performer checks whether zinc or iodoform paste or radiopaque gauze is being used. If so, has appropriate staff member remove dressing or tube or decides to do personally (if appropriate). Checks that radiopaque paste or gauze is completely removed.

i. If not already done, performer explains to patient what will be involved in the procedure:

i) Performer describes what will happen in the allergy test, in infusion of the contrast solution, and in the overhead filming. If patient has a gallbladder, describes what will happen when fatty meal and the post-fatty meal radiographs are taken. Gives patient an idea of how long the entire procedure may take, that there may be possibility of tomography, that patient may be asked to wait in holding area during filming of series.

ii) Performer may explain to patient that side effects may be felt from contrast medium such as feeling of nausea, flushing, choking sensation. May reassure patient that vomiting is normal and that emesis basin will be provided for use.

iii) Performer explains what cooperation will be asked of patient. Explains the importance of patient's being able to relax. Indicates what types of positions the patient will be asked to assume. Describes any probable breathing control, use of compression devices, as appropriate. May demonstrate how tilt table will be used and reassure patient that he or she will be held safely.

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iv) Performer answers patient's nonmedical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains, when asked medical questions, that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

j. Performer encourages patient to relax. Rehearses patient in suspending respiration on exhalation and relaxing. May check patient's relaxation by keeping hand on patient's back to detect tenseness. Performer may judge time interval needed after cessation of respiration for patient to relax. Plans to adjust exposure timing accordingly.

k. Unless measurements have already been made, performer uses centimeter calipers to measure the thickness of the abdomen in the directions in which the central ray of the x-ray beam will pass through the centered part from tube to film.

i) Performer evaluates the patient's bodily habitus to estimate the position of the gallbladder and variations in location between inhalation and exhalation, and between prone, supine or erect positions for centering.

ii) If both recumbent and erect positioning may be used, performer measures or estimates thickness in both positions.

iii) Notes whether the areas of interest are heavily covered by muscle or soft fat, whether the palpation points are easy to find.

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iv) Notes whether the extremities are of unequal length. If so plans to support shorter limb for any erect filming.

v) With female patient performer judges whether the breasts are large and pendulous. If so, may plan to have patient or staff member draw the breasts to the sides and upwards and hold in place.

vi) Records measurements for use in determining exposure factors for overheads. Notes positions for which measurements apply. After measuring, has patient rest in a relaxed supine position on table.

4. Unless already done, performer selects and sets the technical factors for the scout film of the abdomen (or the next overhead radiograph).

a. Performer consults the technique chart posted for the machine. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured for the position and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other accessories (such as screens, grids, bucky, etc.).

b. Makes note of the kVp, mA, T(seconds of exposure time), focal spot size, and the focal film distance (TFD or FFD) called for.

c. Once the standard kVp, mA and time has been determined, performer makes any conversions necessary to account for extreme fat or muscularity, age, the preference of the radiologist involved, and any other conversion needed

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such as posted changes. Performer looks up numerical conversion factors and calculates or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate.

d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

e. Performer sets the exposure factors as selected:

  i) Sets control for radiography mode.
  ii) If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.
  iii) For conventional exposure control, performer sets the milliamperage selected for the correct focal spot size. Sets the selected exposure time that will produce the mAs desired. Sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp.
  iv) For automatic phototimed exposure control, performer sets the category corresponding to the type of study and use of screens, bucky, etc., and, if appropriate, focal spot size. Sets a control corresponding to the selected field size (as listed on technique chart for phototiming).
  May set a kVp range button, if called for with equipment, corresponding to the appropriate kV range for the examination. Sets a density selector corresponding to the usual (or special) requirements for the study. Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made.
  v) Depending on the equipment, may set controls to provide for use of bucky, manual tableside adjustments of table and tube height, position, and of collimation.

5. Performer obtains the appropriate size loaded cassette for the first (or next) scout projection. Attaches identification information to the cassette or table top:

  a. Places right or left marker on film holder or table-top as appropriate or depresses appropriate R or L button for automatic marking.
  b. If patient's identification information is in the form of lead numerals or marker, performer places on appropriate corner of cassette.
  c. If patient identification information is to be entered by use of flasher, sets flash card aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.
  d. Performer may place patient's card into card tray for equipment using automatic film marking device.

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e. Performer places cassette in bucky. May manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.

6. The performer positions the patient for the first or next scout film in supine AP position unless otherwise specified. Plans to center to abdomen and/or right abdomen depending on standard institutional procedures.

    a. Performer may explain or demonstrate to patient what is required. May obtain help in positioning.
    b. When positioning a patient with a balloon catheter in place, performer makes sure that the clamp is not lying over a part to be exposed or that patient is not lying on the clamp.
    c. For supine AP projection (posterior view) of the abdomen performer has patient lie in a supine position on table.

        i) Centers the median sagittal plane of the body (or center of right side of abdomen) to the midline of table. Arranges shoulders and hips to lie on single transverse planes.
        ii) Has patient flex elbows and abduct arms. For thin patients or if so ordered, performer rotates the body slightly with right side against table. Supports knees and immobilizes ankles.
        iii) Performer centers the cassette at the level of the iliac crests unless otherwise specified.

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        iv) Directs central ray at right angles to the midpoint of the film.

    d. Performer may apply a compression band and/or air filled bag to upper abdominal region.
    e. Checks whether patient is able to relax as positioned and immobilized. If not, performer readjusts and recenters until patient is comfortable.
    f. Performer rehearses patient in breathing in, breathing out fully, and holding breath while remaining relaxed until told to breathe again.
    g. Performer sets the focal-film distance if not already done as appropriate. Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.
    h. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size. Uses cross-hair shadows as reference for center of field. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired.
    i. Performer adjusts the collimator so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). Adjusts primary beam to minimum size needed to cover the area(s) of interest.

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j. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest, especially gonads. Provides patient and everyone who will remain in room during exposure with appropriate protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

k. When everything is ready for the exposure, performer reminds patient of the breath control to be used for exposure. Encourages patient to relax. Observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

7. Performer returns to control room.

   a. Makes sure controls are properly set for radiography mode and that patient is still in position.

   b. Tells patient when to take a deep breath and exhale, and hold still while relaxing, as rehearsed, by calling or using intercom.

   c. When respiration has been suspended, performer waits one or two seconds to allow involuntary movement of viscera to subside and then makes exposure or waits number of seconds judged necessary for patient to relax.

   d. Performer initiates exposure by pressing hand trigger or exposure control button.

      i) While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.

      ii) May watch for evidence of malfunction such as line surge or

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excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.

      iii) With phototimer notes whether backup timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure.

      iv) After exposure is completed tells patient that he or she can breathe.

      v) If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

   e. After exposure removes cassette and removes markers for further use.

8. The performer arranges to have the scout film processed at once or decides to do personally.

   a. Attaches ID card for use with flasher if appropriate. May sign requisition.

   b. While film is being processed and/or evaluated performer has patient relax in examination room or holding area. Explains what will happen next. If appropriate, makes sure that patient will be attended while waiting.

   c. If appropriate, moves x-ray tube and any protruding film holder away from patient before patient rises. May decide to assist patient from table. Makes sure patient is reminded of any footrest in stepping off table.

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9. Unless already done, performer informs attending radiologist when patient is ready to be examined. Brings requisition sheet, patient's medical history, chart, the processed scout film and any prior films to radiologist. Displays radiographs on view boxes.

   a. If not already done, performer tells radiologist about any difficulties encountered with regard to information, possible contraindications, or anything else that should be brought to radiologist's attention. Notes any special orders or change in procedure decided by radiologist.
   b. Performer may accompany radiologist to examination room and introduce patient to radiologist.
   c. During radiologist's review of requisition, scout, prior films and examination of patient, performer notes radiologist's orders:

      i) If radiologist decides to terminate procedure, performer proceeds to termination steps described below. If appropriate arranges to have proper forms filled out.
      ii) If radiologist decides that additional cleansing is needed, performer may arrange to have this carried out and/or arrange to reschedule patient.
      iii) Performer notes whether radiologist requires a change in technical factors and/or patient positioning or centering for later overhead filming.
      iv) Notes radiologist's final orders on sequence of examination and whether a test dose will be administered.

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      v) Discusses sequence and timing of procedure with radiologist.
      vi) Once radiologist indicates that infusion of contrast is to proceed, arranges to provide or change any equipment or supplies as ordered by radiologist.

10. If performer is to assist with test injection of contrast medium, washes hands, observing sterile technique as appropriate.

   a. If appropriate, performer opens packet of sterile gloves for radiologist observing sterile technique.
   b. May assist as appropriate by handing materials asked for.
   c. May check syringes prepared with contrast medium (iodine based solution) or decides to do personally.
   d. Performer may use the time while physician or co-worker observes patient's reactions to reset technical factors for next overhead film, accounting for use of contrast, radiologist's orders, and the patient position to be employed.
   e. Performer may provide emesis basin for patient if he or she feels nausea. May reassure patient. Provides clean towels and gown if necessary and assists in cleansing patient and/or equipment.
   f. If radiologist decides to cancel procedure performer proceeds as described below.

11. If radiologist decides to proceed with IV infusion of contrast, per-

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former assists radiologist to set up IV; position's patient as appropriate.

a. Performer assists radiologist to care for patient if there is nausea or vomiting as described above. May provide damp cold towel to alleviate flushing symptoms.
b. Performer stands by to assist radiologist or patient while infusion proceeds over the appropriate period of time and while IV apparatus is removed.
c. Performer notes radiologist's orders for the series of cholangiograms or notes order for standard series.

   i) Notes number of radiographs, time intervals, patient position(s) and any orders for centering.
   ii) Notes the time that the infusion is completed and calculates intervals from that time.
   iii) Plans to make a series of overheads, send for processing, and present to radiologist for review as each exposure is made until radiologist is satisfied.

12. Performer positions for the first cholangiogram as described above except as follows:

a. Performer plans series for appropriate intervals and marks each cassette to indicate the post-injection time elapse.
b. If centering has not been indicated by radiologist, performer judges the location of the biliary area based on the patient's type of body (habitus) and the evidence of any prior films. Plans to adjust for higher centering for supine positions and obese, hypersthenic patients, and lower centering for prone or erect positioning and thin, asthenic patients.

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c. Throughout procedure performer remains alert for any symptom of severe pain or adverse reaction to the contrast. As soon as performer judges that reaction may be severe, ceases exposure and notifies radiologist or attending physician at once.
d. If patient has a urinary catheter in place, performer turns patient toward the catheter and tubing to prevent separating it from drainage bottle and breaking sterile system and to avoid causing pain.
e. Performer positions as follows or as described above or in later steps depending on the position(s) ordered.
f. For a right AP oblique projection (right posterior oblique view) of the extrahepatic bile ducts, performer has patient assume a supine position with the estimated area of the biliary tract centered to the midline of the table.

   i) Elevates the left side of the body about 15° to 20°. Supports the elevated shoulder, hip and knee. Has patient extend hips and knees so that back is arched. May place arms in comfortable position with hands under or above head.
   ii) Centers film to estimated biliary tract area adjusted for patient's position and body type or as indicated.
   iii) Places inflated bag or radiolucent wedge under abdomen.
   iv) Directs central ray at right angles to midpoint of film or at 20° cephalad to the center of the film.

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g. Performer repeats shielding and collimation steps as appropriate as described above. For small fields performer attaches an auxiliary extension cone to collimator to further reduce the primary beam. Repeats orders for breath control and relaxation and makes exposure as described above.

13. Performer arranges to have each cholangiogram processed as soon as it is exposed and presents to radiologist.

    a. While films are being processed, performer makes sure that patient is comfortable and, if necessary, attended by radiologist, staff member, or self.
    b. Performer keeps track of timing and continues with filming at appropriate intervals.
    c. Carries out radiologist's orders for changes in technical factors, tube or table angulation, patient position and/or centering.
    d. Continues until radiologist indicates that opacification of ducts and series filming is completed.
    e. When the post-injection series are completed, performer notes radiologist's orders for termination, tomography, and/or cholecystagrams, fatty meal, a post-fatty meal series, and any delayed films.

14. Throughout procedure, if performer is asked to repeat any exposures, performer notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes."

    a. If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member.

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    b. If request for retakes reflects the preference for density or contrast of the radiologist, performer notes for future work done for the given radiologist so that retakes can be avoided.

15. If the radiologist decides to order tomography, performer notes radiologist's orders. May provide requisition sheet for radiologist to fill out and sign. Prepares for tomography:

    a. Performer notes the type of tube-film travel pattern involved (such as linear, circular, elliptical, or hypocycloidal tomography). Notes whether zonography is called for (exposure angle of 10° or less), whether plesiotomography is called for (simultaneous multi-level tomography using "book" cassettes). Notes whether asymmetrical tomography (incomplete linear sweep) is ordered.
    b. Performer notes the patient positions and views called for, the areas to be included in the central beam; notes the exposure angle (amplitude), speed, the number of "cuts," for the first preliminary tomograms (such as one "cut" at expected plane of interest, one or more at given cm's above and/or below).
    c. If appropriate, performer may set radiography or tomography mode selector and set collimator control for manual operation.
    d. Makes sure that markers are available for recording of level and amplitude.
    e. Makes sure that an adequate supply of loaded cassettes of the

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appropriate types and sizes are available in the examination room, including book cassettes if appropriate. If not, arranges to obtain or decides to obtain personally.

f. If appropriate, such as with wide angle hypocycloidal tomography, performer may insert additional filter (as designated) into beam column.

g. If a tomography attachment is to be put in place (to be used with conventional tubemount, generator, and horizontal bucky x-ray table), performer obtains the necessary equipment and assembles:

  i) Checks that table is in horizontal position.
  ii) Attaches fulcrum assembly along the table top rail at head end of table and secures.
  iii) Attaches fulcrum assembly plug to appropriate electrical receptacle.
  iv) Attaches the fulcrum bar and bucky link bar as appropriate to equipment and moves the tubemount over the fulcrum assembly. Adjusts so that angulation and fulcrum level indicators are facing appropriately.
  v) Slides fulcrum bar into fulcrum assembly as appropriate and locks.
  vi) Adjusts tubemount to prescribed focal-film distance. (May check technique chart for tomography.)
  vii) Moves the tomographic mechanism manually through the maximum travel and checks that there are no restrictions such as from cables or other attachments. Adjusts as appropriate.
  viii) Engages the drive mechanism for horizontal travel as appropriate and removes engaging rod. Sets lock switch if appropriate to prevent alternative travel motion.

h. Makes sure that tomography power switch is off (if appropriate).

i. Washes hands again as appropriate.

j. Performer has patient assume a comfortable recumbent supine position (unless prone position is called for and repositioning will be painful).

k. Explains to patient what will be involved in the procedure; indicates what types of positions the patient will be asked to assume, the cooperation that will be asked of the patient. Performer may manually demonstrate the action of the x-ray tube during tomography.

16. Performer prepares the equipment to make the preliminary tomogram(s):

a. Performer selects the appropriate cassette size, with film and screen speeds appropriate to the equipment and the area of interest. Performer attaches identification information to the cassette or table top as described earlier. Prepares marker giving the level at which the fulcrum will be set for the given exposure and attaches to cassette or table-top as appropriate.

b. Performer places cassette into bucky tray as described earlier.

c. Performer sets the fulcrum (layer height) level for the first (or next) exposure:

  i) If a "book" cassette is to be used, performer sets the fulcrum level to coincide with the uppermost body layer to be projected.

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ii) If an automatic layer height selector is available, performer sets the controls to the interval distances selected, and sets the fulcrum for the uppermost or lowermost body layer desired depending on the direction of the automatic change.

iii) Sets the fulcrum level using hand crank or power switch and checks the setting on the fulcrum (layer height) indicator.

d. Performer sets the amplitude (sweep):

i) Makes sure that x-ray tube is centered at zero angle. Checks focal-film distance.

ii) Sets the prescribed exposure angle or amplitude as appropriate for equipment and checks angle on indicator.

e. Performer sets the sweep speed as prescribed, according to the speeds available for the equipment, the exposure angle selected and established procedure for the area of interest (or patient's age). Notes the duration or actual exposure time as the product of the angle and the sweep speed selected.

f. For linear tomography, performer sets the directional control switch to right or left for horizontal travel to reflect the direction in which the tube will travel during the actual exposure.

i) For other types of motion performer sets comparable selector(s) so that tubemount is in start position.

ii) For asymmetrical exposure, determines whether the arc to be used will be at the beginning of tube travel or near the end, and adjusts equipment as appropriate.

g. Performer selects and sets the exposure factors for the first tomographic projection. Consults technique chart for tomography for the unit being used.

i) Takes account of total heat units and checks with cooling chart. May plan pacing of exposures to allow cooling.

ii) If appropriate, performer reconverts the technique to an equivalent output using higher kVp, lower mA, or faster sweep speed.

iii) Performer may plan to vary the exposure technique for the scout radiographs so as to provide radiologist with visual choice for the particular patient. If so, records the planned techniques for each scout film in relation to the level of the "cut" for each.

iv) Performer sets the exposure factors selected as described earlier.

17. Performer carries out scout tomography. Positions patient in AP, PA, lateral or oblique recumbent positions as called for, following procedures described above or in later steps except as follows:

a. Centers area of interest to center of film (in bucky) using light beam in collimator, cross-hair shadows as reference for center of field, and by moving bucky carriage. May use automatic aligning mechanism. Immobilizes patient as appropriate.

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b. Cautions patient to keep fingers away from table edges. Advises patient to keep eyes closed to avoid following the movement of the x-ray tube. Explains that patient must hold position for successive "cuts."

c. Performer checks that no obstructions are present which might restrict tubemount travel such as palpator or cables.

d. Performer provides shielding, collimation and breathing instructions as described above.

e. Performer tests tomographic set-up by proceeding with tubemount sweep but not activating exposure. Has patient practice breathing out and holding still as ordered and permits patient to sense the duration time for each sweep:

   i) Turns on power for tomographic attachment or mode. Using appropriate switch, activates tomographic sweep action without activating exposure, and holds until tubemount reaches the extreme limit of travel.
   ii) Returns tubemount to other extreme position, holding until tubemount travel is complete. Interrupts travel at any point and makes any adjustments necessary. Returns equipment to "start" position.

f. When everything is ready for the exposure, performer reviews with patient the breath control to be used for exposure. Rechecks position.
Reminds patient if position is to be maintained for further cuts. Performer observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

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g. The performer returns to control room. Makes sure controls are properly set and patient is still in position. Tells patient when to breathe as instructed by calling or using intercom. Performer initiates tubemount action and exposure by pressing hand trigger or exposure control button (twice if two stage control is appropriate). Holds down or continues to press exposure control until tube travel is completed. Then releases exposure switch at once.

   i) For asymmetrical exposure initiates exposure or terminates at appropriate stage of tube travel.
   ii) After exposure is completed tells patient that he or she can breathe.
   iii) If there is any problem during the exposure, performer releases switch at once and sets back to "start" position before attempting another sweep.

h. After exposure performer returns to patient. Removes cassette from bucky.

   i) Removes any markers.
   ii) Performer places ID, R-L and appropriate next layer height marker on cassette for next scout (unless book cassette was used).
   iii) Inserts new cassette as described.
   iv) Changes fulcrum to new layer height (level) as appropriate, unless this will be done automatically.
   v) If more than one patient position is to be used for scouts, repositions patient if appropriate.

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- vi) If new patient position is required that calls for change in exposure factors, or if a variety of factors are to be used, performer changes technical factors as appropriate.
- vii) Performer adjusts collimation and shielding and repeats exposure for next scout tomogram.
- viii) Performer continues until all scout tomogram exposures have been made.
- ix) Performer arranges to have the scout tomograms processed at once or decides to do personally. Attaches ID card for use with flasher if appropriate. May sign requisition. While films are being processed, makes sure that patient is comfortable and, if necessary, attended by staff person or self.
- x) Performer brings the processed scout tomograms directly to the radiologist in charge or places on view boxes and informs radiologist that they are ready. May also hang prior films.
- xi) Performer notes instructions from radiologist regarding the position and the layer levels, amplitude, and number of cuts to be made for each position. Notes radiologist's preference for technical factors.

18. Depending on radiologist's orders, performer makes tomographic exposures at the selected interval cuts (amplitude) and levels required for each position ordered, as described above:

    a. Readjusts fulcrum level, technical factors, patient positioning, collimation and shielding as appropriate. Makes sure ID, R-L and layer heights are marked. Makes

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exposures and has tomograms processed at once as above.

b. Brings tomograms to radiologist and displays on view boxes as before.

c. Performer notes whether a given level will be further defined by smaller "slices" (expanded amplitude) within a more restricted area. If so, repeats procedures after adjusting amplitude and redetermining exposure techniques.

d. Performer refrains from commenting on the films to patient or providing any interpretation.

e. Performer shows subsequent sets of tomograms to radiologist as processed, and proceeds as described above until radiologist indicates that tomographic examination is completed.

f. When radiologist indicates that tomography is completed performer disassembles tomography equipment as appropriate.

   i) Turns off energy for tomographic attachment and/or unplugs.
   ii) With tomographic attachment, disassembles by reversing the attachment procedures.

19. If patient has gallbladder and radiologist has decided to order cholecystograms, performer notes the timing required before gallbladder is opacified and radiologist's orders for patient positions, projections and centering.

    a. Performer judges the location of the gallbladder based on evidence of the prior films and the patient's body type.
    b. Plans to process each film as exposed and present to radiologist.

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c. Marks each cassette with indicator to show time elapse and/or use of suspended inhalation if so ordered.

20. Performer positions as follows for gallbladder views or as described earlier depending on positions ordered:

a. For a prone PA projection (anterior view) of the gallbladder, performer has patient lie in prone PA position on table.

  i) May have patient rest head on left cheek. Has patient flex right elbow; adjusts arm in comfortable position with left arm alongside body. Elevates ankles.
  ii) Centers estimated area of gallbladder to midline of table. Centers film to the center of the estimated location of the gallbladder adjusted for the patient's body type, evidence on prior films, breathing instructions, and position of patient, as described.
  iii) May place pillow under head and extend with thin patients so that upper chest is also supported. May place pad under iliac spines. If female patient has pendulous breasts, has her spread breasts upward and outward.
  iv) Directs central ray at right angles to midpoint of film.
  v) Applies compression band and/or air filled bag to upper abdominal region.

b. For a supine AP projection (posterior view) of the gallbladder, performer positions as described above, but centers to the area of the gallbladder as estimated, allowing for body type and position of patient. Applies compression.

c. For an erect PA projection (anterior view) of the gallbladder, performer has patient stand in PA position facing vertical cassette holder or bucky.

  i) Has patient distribute weight evenly. Supports shorter limb if limbs are of unequal length.
  ii) Centers estimated area of gallbladder to midline and film to estimated level of gallbladder, adjusted for position and body type.
  iii) May have patient extend chin over top of cassette. May have patient extend arms along sides of holder and grasp edges.
  iv) Applies compression as appropriate. Performer makes sure that patient is maintained in erect position long enough before exposure for small gallstones to be accurately demonstrated.
  v) Directs central ray at right angles to center of film.

d. For a right lateral decubitus projection of the gallbladder, performer uses a vertical bucky or cassette holder with patient lying on table. Notes whether PA or AP projection is required.

  i) Has patient lie on right side with left side supported and film placed vertically in front of patient with tube positioned horizontally behind (for PA projection) or the reverse (for AP projection).

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ii) Centers film to estimated area of gallbladder, adjusted for likely drop in location of gallbladder in this position towards the midaxillary line.

iii) Has patient flex knees comfortably. Places supports under and between knees and ankles. Has patient flex elbows, place lower hand under head, and has patient grasp side of table with opposite hand. Elevates the torso.

iv) May apply compression. Allows patient to maintain position long enough before exposure for small gallstones to be accurately demonstrated.

v) Directs central ray horizontally at right angles to midpoint of film.

vi) For a lateral view centers cassette in bucky in table and directs central ray vertically at right angles to center of film.

e. For a left PA oblique projection (left anterior oblique view) of gallbladder, performer notes the degrees of rotation required, the number of oblique views ordered, and the change in rotation between exposures. Marks cassette to show angulation.

i) Performer positions patient in the prone position with head resting on left cheek and left arm alongside body. Rotates body so that right side is elevated. Has patient support himself or herself on right forearm and flexed knee and adjusts rotation to the desired degree.

ii) Centers patient so that estimated location of gallbladder is at the midline; centers film to estimated level of gallbladder, adjusted for body type and position.

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iii) Applies inflated bag or radiolucent wedge under abdomen.

iv) Directs central ray at right angles to midpoint of film.

v) Rehearses patient in suspending breathing at end of exhalation for exposure; has patient plan to hold position until directed to change rotation for the next exposure in series.

f. For PA lordotic projection (anterior view) of the gallbladder, performer uses upright cassette holder or bucky.

i) Has patient stand or sit in PA position before upright cassette holder with right side of abdomen centered to midline.

ii) Has patient grasp sides of stand or table, brace abdomen against it, and lean backward as much as possible or with thorax at a 45° angle.

iii) Centers film to the estimated level of the gallbladder (adjusted).

iv) Directs central ray horizontally at right angles to midpoint of film.

g. If gallbladder location has not yet been determined, performer may mark the centering point being used on patient's body.

h. Performer again checks for ability of patient to relax,and repeats appropriate breathing instructions. Repeats appropriate collimation. Provides shielding and makes exposure as described above.

i. Performer has each exposure processed and presents to radiologist for review as described above.

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i) Notes orders for further overheads to locate gallbladder or provide better visualization.

ii) If overhead has not localized gallbladder, performer removes any centering mark until localization has been determined. Then uses correct mark for further centering.

iii) If radiologist requires additional centering and/or positions, performer repeats overhead filming as appropriate to new projections, as described above.

iv) Continues until radiologist is satisfied with technical factors, centering and visualization.

j. When radiologist indicates that pre-fatty meal radiography is completed, notes any orders for fatty meal, post-fatty meal and post-evacuation overheads. Notes required time intervals.

21. If the radiologist has ordered a fatty meal, performer has radiologist's orders carried out and patient given meal or fed as appropriate. May decide to do personally.

a. If patient may leave the department for meal, performer makes sure that patient or accompanying adult knows exact time to return.

b. With in-patient, may arrange to have nursing staff in charge of patient's care informed. Performer may arrange to have patient taken to appropriate holding area and records or keeps track of the time elapsed. If appropriate, makes sure that patient is in the care of a staff person who will transport to appropriate location and return patient at appropriate time.

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c. After appropriate elapse of time after fatty meal, performer has patient returned, and prepares for overhead filming of post-fatty meal radiographs.

d. Marks each cassette with post-fatty meal time elapse.

e. Performer may have patient assume right AP oblique position as described earlier, or performer positions as ordered or as standard for series (or single film). Carries out all appropriate steps as described earlier.

22. If, when post-fatty meal evacuation films are completed, radiologist orders a delayed series of the common bile duct and/or gallbladder, performer may provide requisition sheet and have radiologist fill out and sign, or proceeds as appropriate as described above to make, process, and present post-fatty meal, post-evacuation radiographs.

23. When performer is told by radiologist that the examination has been completed, performer carries out termination steps for the examination:

a. If appropriate, arranges to have fresh colostomy and/or dressing applied (if removed for radiography). Has patient cleansed if appropriate.

b. May have patient transported back to holding area or next location, or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise.

c. If appropriate, makes sure that patient is in the care of a staff person who will transport to

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appropriate next location or, if out-patient, will arrange to discharge or send patient home (with escort if appropriate). d. May have room and equipment cleaned; has any other appropriate clean up procedures followed to avoid infection or contamination, or decides to do personally, depending on institutional procedures. e. Performer records the examination according to institutional procedures. May include date, room, examination type, the overhead views taken, the technical factors used, and film sizes. May record the number of exposures made of each overhead view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. Signs requisition sheet. f. May present requisition form to radiologist for comments and signature. May present forms for requisitions for later delayed films and/or additional examination(s). g. Performer may decide to jacket radiographs, requisition sheets, and related materials, and/or have information recorded in log book personally, or have this done, depending on institutional procedures. h. May indicate to appropriate staff person when the performer is ready to proceed with next examination.	

TASK DESCRIPTION SHEET

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1. What is the output of this task? (Be sure this is broad enough to be repeatable.)

Requisition reviewed;pt. reassured;abdomen measured; films identified;technical factors selected and set for fluoroscopy,spot filming,overheads;scouts taken; radiologist assisted with injection,positioning,fluoroscopy;serial cholangiograms taken as ordered,processed,presented,repeated as ordered;pt. returned; examination recorded;radiographs placed for use.

2. What is used in performing this task? (Note if only certain items must be used. If there is choice, include everything or the kinds of things chosen among.)

Pt.'s x-ray requisition sheet,ID card,ID bracelet, medical-technical history,prior radiographs;phone, procedure tray for percutaneous puncture or T-tube injection;iodine-based contrast solution;heater; emergency cart;view boxes;pen;x-ray generator,control panels,tube,bucky,table,collimator;fluoroscopy unit,image intensifier,spot film device,TV monitor; cassettes;roll film;ID,R-L,series,breath control markers;compression band,inflated bag;marking pen; extension cones;stool;calipers;vertical cassette holder;lead aprons,shielding;immobilization devices; technique,standard view,tube rating and rad exposure charts;forms;phantom or test object;stretcher;wheelchair;intercom

3. Is there a recipient, respondent or co-worker involved in the task? Yes...(X) No...( )

4. If "Yes" to q. 3: Name the kind of recipient, respondent or co-worker involved, with descriptions to indicate the relevant condition; include the kind with whom the performer is not allowed to deal if relevant to knowledge requirements or legal restrictions.

Non-infant pt. to have percutaneous or T-tube cholangiography;radiologist;co-workers;accompanying adult;nurse

5. Name the task so that the answers to questions 1-4 are reflected. Underline essential words.

Taking percutaneous or T-tube cholangiograms of non-infant pt. by reviewing request,preparing pt. and equipment;measuring;setting up for fluoroscopy,spot filming;taking scout films as ordered;setting technical factors;identifying films;collimating;providing shielding;assisting in positioning of pt.,fluoroscopy,spot filming;taking postinjection cholangiograms as ordered;arranging for processing;continuing as ordered;having pt. returned;placing radiographs for use;recording.

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Performer receives or obtains the x-ray requisition form,patient identification card,and any appropriate medical-technical history for a non-infant patient scheduled for percutaneous transhepatic cholangiography (preoperative contrast study of biliary ducts after direct puncture injection of the ducts) or T-tube cholangiography (postoperative contrast study of biliary tract by direct injection into a tube left in place in common bile duct during prior surgery) as a result of:

a. Regular assignment.
b. Checking assignment on schedule sheet.
c. Having arranged requisitions in order of priority.
d. Receiving from co-worker.

Performer may also receive prior films and/or a scout film already taken by co-worker,with record of technical factors used and/or any changes necessary.

1. Performer reads the requisition sheet to determine the examination called for, the patient involved, special considerations, and to check the completeness of the information provided:

   a. Performer checks the examination called for and the purpose. Notes whether a routine scout film is ordered and any special requests.

OK-RP;RR;RR

6. Check here if this is a master sheet..(X)

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b. Notes the name of the radiologist in charge; may note the name of the referring clinician and/or surgeon.

c. Performer reads patient's name, identification number, sex, age, weight, and height. Notes whether patient is in-patient or out-patient. Notes any special information,such as whether patient has a gallbladder,or note on known pathology that could affect patient positioning, technique, or handling. Notes whether patient has history of allergies, results of any prior allergy test. Notes shielding needed.

d. Performer checks whether patient is suffering from a collateral condition requiring special handling such as heart disease, communicable or infectious condition, infirmity, incoherence; whether patient has IV drip, oxygen supply, urinary catheter, colostomy, or similar device in place. Notes whether patient will be on a stretcher or in a wheelchair. Notes whether patient will be accompanied by nurse or other staff person, whether there are orders for removal of dressing from the abdominal area.

e. Performer makes sure that the request is properly authorized, that information on requisition sheet is complete:

  i) Depending on institutional procedures, performer may review patient's radiation exposure history, prior record of techniques used, and cumulative exposure.

  ii) Checks whether any special orders on exposure factors are in keeping with the usual rad exposure involved for the examination.

  iii) Depending on institutional procedures, performer notes whether female patient is pregnant, reviews date of female patient's last menstrual period, or notes any other indication that there is no danger of exposure of a known or possible fetus.

f. Performer notes orders for prior preparation of patient such as preliminary diet, abstinence from food and drink; use of cleansing enemas, and/or sedation. May check whether these have been carried out; performer may check timing to be sure a proper elapse of time has occurred such as for sedation to take effect. If appropriate, arranges to have any omitted steps carried out with delay in examination or plans to notify radiologist.

g. If the performer determines that the request is not properly authorized, is incomplete, or that sufficient information is lacking for performer to select technique or to properly position or care for patient, or if performer considers that there may be contraindications to going ahead with the procedure, performer brings this to attention of radiologist in charge. Explains the problem if appropriate, and proceeds after obtaining needed information, signature, or orders.

h. If prior radiographs already on file are to be presented with scout film to radiologist, and if not already with patient's jacketed material, performer arranges to have prior films delivered.

2. Performer goes to appropriate room for the type of examination involved and the equipment required, or notes room assigned on requisition sheet. Prepares ahead so as not to keep pa-

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tient in examination room longer than necessary:

a. Washes hands as appropriate.
b. Checks that procedure tray has been prepared for the study involved or decides to do personally. Checks that materials are present for injection of contrast solution. Makes sure that emergency cart is present. Checks for emesis basin and towels.
c. Performer makes sure that x-ray equipment has a fluoroscopic capability, that x-ray tube has appropriately small fractional focal spot. May check that contrast solution is at appropriate temperature or arranges to heat or cool.
d. Checks that proper accessories are available for procedure including leaded rubber shielding, aprons, and gloves to be used by performer, radiologist, the patient, and/or anyone who will remain in the room during exposure.
e. Checks that appropriate immobilization devices are present such as compression band and air filled compression bag, that there is a mattress, pads, pillows and/or blankets for comfort of patient. May set up footboard at end of tilt-table and attach compression devices.
f. Makes sure that right (R) and left (L) markers are available for use, identification cards or leaded numerals or markers, and markers to indicate time elapse in series and unusual breath control orders or positions.
g. For overhead filming performer makes sure that an adequate supply of loaded cassettes and appropriate cassette holders are available in the examination room. Selects appropriate speed and type of film, grid and cassette combination based on standard instititional practices.

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Selects size based on patient's size and area of interest. If adequate supply is not in room, arranges to obtain or decides to obtain personally.

h. Performer prepares for identification of overhead films using equipment provided by institution:

    i) May obtain lead numerals and tape and prepare identification strip for placement on film holder(s) giving appropriate patient identification information.
    ii) Performer may prepare for use of flashcard by checking that there is piece of lead on film holder surface; may write or type out ID information on card if not received with requisition.
    iii) Checks identification against requisition sheet.

i. If spot filming will utilize a camera attached to image intensifier and roll film, performer checks film supply indicator to make sure that there is sufficient film in the roll film cassette.

    i) If there is insufficient roll film in camera, performer arranges to have roll film cassette loaded, or decides to do personally.
    ii) When loaded roll film cassette is obtained, performer checks loading in subdued light. Checks that end of film is cut correctly and is properly threaded and attached to take-up spool so that film unwinds appropriately. Checks that film is properly engaged in sprockets. Locks into operating posi-

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tion. If appropriate, cuts off excess film at exit port and removes. Attaches film cassette to camera and locks into place. Replaces camera cover.

iii) If there is an adequate film supply, checks that film is properly loaded.

iv) Performer advances film to compensate for any exposure of film due to installation or check.

v) Removes dark slide from camera lens.

vi) If not already done, performer writes or types a card with patient's identification information for use with spot film device. Inserts in slot in spot film camera as appropriate.

j. If spot filming during examination will involve use of a cassette/bucky spot film device, performer checks that there is an adequate supply of appropriate size cassettes in room.

i) If there is insufficient supply of cassettes, arranges to obtain or decides to obtain personally.

ii) Performer carries out identification of the spot film cassettes as for overhead films.

iii) Performer may use controls or manually pull out spot film bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position.

iv) If R-L markers are to be used with spot filming, performer

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tapes into place on image intensifier screen or plans to tape to patient's body.

k. If a grid will be used with the image intensifier for fluoroscopy and/or spot filming, performer positions and centers grid if not already done. May use control button or slides grid into position. May check that the grid is oriented toward the x-ray tube, with grid lines parallel to the long axis of the tube.

3. Performer reviews and sets technical exposure factors for fluoroscopy and spot filming based on standards set by the institution for the examination involved:

a. Dons protective leaded rubber garments such as apron and gloves.

b. Makes sure that no one is in examination room or control room.

c. Performer reviews the technique chart(s) for the unit(s) to be used:

i) Locates information for the projections involved. Takes note of the exposure factors to be used for overheads and fluoroscopy. Considers preferences of the radiologist involved.

ii) Notes any newly posted changes in technical factors (to reflect accommodation to a change in machine output or a policy decision).

iii) Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal

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spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.

d. Performer makes sure that indicator light shows that x-ray generator is "warmed up" and ready for use. Makes sure that all circuits have been stabilized. If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter.

e. As appropriate performer sets x-ray generator mode selector(s) for overhead scout film, for later use of fluoroscopic mode, and use of spot film camera or cassette device.

f. Performer sets controls on image intensifier for spot film camera or cassette device:

  i) For spot film camera, performer selects and sets the rate (frames per second) for the camera according to standards set for examination.
  ii) For cassette spot filming, performer may select and set a standard spot film program providing for format combinations such as single, half, or quarter combinations on a single cassette and related spot film sizes. Selects program appropriate for examination or awaits orders from radiologist.

g. If not already done, performer connects TV monitor to power outlet. Turns on monitor and checks that "ready" light is on.

h. If appropriate, performer selects the proper field size selector (if there is dual image intensifier).

i. Performer selects and sets exposure factors for fluoroscopy:

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  i) Selects and sets the kVp at standard setting for the examination. May check indicator dial. With automatic density control, sets density selector as appropriate for examination.
  ii) If mA is automatically controlled according to patient thickness, performer turns fluoroscope mA selector to maximum standard position. If not automatically controlled, sets as appropriate for focal spot size and examination involved.
  iii) Sets fluoroscopic examination timer to maximum position.

j. If appropriate, performer selects and sets exposure factors for spot filming:

  i) For conventional manual exposure control, performer selects and sets the appropriate spot film time for the examination.
  ii) For automatic, phototimed exposure control, performer selects a density exposure control appropriate for the examination.
  iii) Performer selects the appropriate mA for the examination and the focal spot size to be used.
  iv) Performer selects and sets kVp by combining settings on one major and one minor kVp selector as appropriate for the examination.

4. If not already done, performer returns to examination room to set up x-ray and fluoroscope tube(s), image intensifier, collimator and accessories, as appropriate, for check of equipment prior to examination:

a. Makes sure that no one is in room.

b. Places phantom or appropriate test object on radiography table where

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patient's area of interest will be centered for examination.

c. Adjusts fluoroscopic tube stand (above or below table) so that tube is at zero degrees and centered to the area of interest.

d. If not already done, moves image intensifier and any spot film device into position; centers (over or under) the area of interest.

e. Performer adjusts the x-ray tube to appropriate focal spot-object distance (target to object distance, TOD). For fluoroscopy, adjusts distance between focal spot and image intensifier (focal spot to film distance, FFD). Makes sure that TOD is 15 inches or more. Operates controls or manually moves the x-ray tube(s) into place. Checks the focal-film distance by reading indicator scale in the tube housing; adjusts up or down until the required FFD is obtained.

f. Performer may collimate fluoroscope tube (and x-ray tube used for spot filming if different), depending on nature of the equipment and controls:

  i) Adjusts fluoroscopy beam shutters to the field size anticipated for fluoroscopic examination or sets shutter mode selector to automatic collimation.

  ii) Manually sets collimator for the spot film field size to be used, or selects and sets field size control to be used for automatic collimation with programmed spot film cassette exposure sequence.

5. If not already done, performer checks functioning of fluoroscopy equipment by entering remote control room or

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operating controls in examination room behind leaded screen:

a. To check fluoroscopy mode, performer turns on TV power switch controls as appropriate. Activates fluoroscope exposure by pressing footswitch or as appropriate. Views test object being fluoroscoped on TV monitor.

  i) Performer adjusts kVp control (and mA control if appropriate) and observes effects on TV monitor to be sure that equipment is operating properly.

  ii) Checks mA meter and notes whether appropriate reading is obtained.

  iii) Performer checks that TV brightness controls are operating and adjusts for preliminary viewing.

  iv) Checks examination timer by noting whether time elapse indicator moves during exposure showing decreasing time left for examination. May check that exposure is terminated when maximum examination exposure time is reached.

b. To check spot film functioning, performer may move cassette or roll film into x-ray exposure field using appropriate controls.

  i) Performer activates controls for spot film exposure. Notes whether cassette or roll film transport is operating appropriately. Notes whether exposure is terminated by phototimer or, if manual timer, in time set. If appropriate, releases spot film control after exposure.

  ii) If equipment is operating appropriately, performer unloads

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cassette and reloads or advances roll film as appropriate. Moves bucky out of way until fluoroscopy is completed.

c. After equipment has been checked performer shuts and resets for standard exposure factors. If performer decides that any of the equipment is not functioning properly, performer informs appropriate staff member. Arranges for alternate unit to be used.

6. Performer readies patient for the examination:

a. Performer washes hands as appropriate. Depending on patient's condition, may decide to arrange for or carry out isolation or decontamination techniques.
b. Performer has the patient called from the holding area and prepared for the examination (if not already done), or decides to do personally.
c. Depending on institutional arrangements, performer may decide to escort out-patient to or from dressing room. May decide to assist in transporting patient from holding area or have this done.
d. Performer greets patient and any accompanying staff person and introduces self. Checks patient's identity against the requisition sheet. With in-patient, checks hospital identification bracelet or other identifier. If patient is accompanied because of seriousness of condition, performer checks with accompanying staff member on any special precautions necessary during procedure.
e. Performer has patient assume a comfortable recumbent or seated position, as appropriate.

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i) If appropriate, places mattress, pillow or clean linen on x-ray table. May place pad, blanket or pillow under bony prominences to provide comfort for recumbent patient.
ii) If patient is in wheelchair may move patient in chair into position next to table. Makes sure that wheelchair is in locked position.
iii) Performer may decide to assist patient from wheelchair or stretcher to table or has this done. May obtain help. Makes sure that no equipment is in the way that may be collided with by patient.
iv) If assisting patient to step on footstool in order to get on table, helps patient turn into position, step backwards on stool, and then sit and/or lie on table.
v) If patient is on special stretcher, places stretcher into position so that radiolucent stretcher can be lifted with patient on it from wheeled base to x-ray table. May arrange to move or have patient moved to table.

f. If not already done, has patient's clothing removed and provides gown or drape. May assist patient or request assistance from nurse. Permits patient to keep covered with gown until measurements are taken and until exposure. Treats young patient with as much courtesy as adult.
g. If not already done, performer questions patient or accompanying adult about preparatory procedures ordered:

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i) If not already done, questions patient or accompanying adult about any allergies, especially to shellfish, or adverse reactions to contrast medium (especially iodine based).

ii) Performer may make sure that an out-patient has made arrangements to be escorted home and to postpone normal activities for the rest of the day.

iii) If appropriate and not already done, questions female patient of child bearing age regarding possible pregnancy.

iv) Checks whether patient with T-tube has a dressing involving zinc or iodoform paste or radiopaque gauze. If so, has appropriate staff member remove dressing or paste or decides to do personally (if appropriate). Checks that radiopaque paste or gauze is completely removed. May unclamp T-tube and allow bile to drain into basin or may have this done.

v) If any preparatory procedures were not carried out, if patient has sensitivity to contrast, or if there is any possibility that patient is pregnant, and these have not already been recorded, performer informs radiologist at once and proceeds only with approval.

h. If not already done, performer explains to patient what will be involved in the procedure:

i) Performer explains what cooperation will be asked of patient. Describes injection procedure for contrast and what radiologist will be doing. Indicates what types of positions the patient will be asked to assume. Describes any probable breathing control, use of compression devices, as appropriate. May demonstrate how tilt table will be used and reassure patient that he or she will be held safely.

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ii) Performer encourages patient to relax. Rehearses patient in suspending respiration (inhalation and/or exhalation) and relaxing. Performer may check patient's relaxation by keeping hand on patient's back to detect tenseness. Performer may judge time interval needed after cessation of respiration for patient to relax and plan to adjust exposure timing accordingly.

iii) Performer answers patient's nonmedical questions honestly; attempts to reassure patient and develop confidence. Treats patient with dignity and concern regardless of patient's behavior. Remains aware that patient may be frightened and/or in pain. Performer explains, when asked medical questions, that it is not appropriate for technologist to answer these; encourages patient to speak to physician.

i. Unless measurements have already been made, performer uses centimeter calipers to measure the thickness of the abdomen in the directions in which the central ray of the x-ray beam will pass through the centered part from tube to film.

i) Performer evaluates the patient's bodily habitus to estimate the position of the biliary tract and variations in location between inhalation and exhalation, and between

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prone, supine or erect positions for centering purposes.

- ii) If both recumbent and erect positioning may be used, performer measures or estimates thickness in both positions.
- iii) Notes whether the areas of interest are heavily covered by muscle or soft fat, whether the palpation points are easy to find.
- iv) Notes whether the extremities are of unequal length. If so, plans to support shorter limb for any erect filming.
- v) Records measurements for use in determining exposure factors for overheads. Notes positions for which measurements apply. After reassuring, has patient rest in a relaxed supine position on table.
- vi) Performer may tape R or L marker to patient if appropriate for use in spot filming.

j. Performer may note whether a preliminary scout film has already been made of the patient (done by another radiologic technologist).

- i) If a scout film has already been made and viewed by radiologist, performer notes the technique used or ordered and plans technical factors for overhead radiography, adjusting as appropriate.
- ii) If a scout film has been made but not approved, performer places processed scout film and any prior films with patient's chart or places on view box for review by radiologist.
- iii) If a scout film has not been made and is required before patient is seen by radiologist, performer plans to proceed as

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described below, following orders or standard procedure.

7. Performer informs attending radiologist when patient is ready to be examined. Brings requisition sheet, patient's medical history, chart, scout film (if already done) and any prior films to radiologist. Displays radiographs on view boxes.

a. If not already done, performer tells radiologist about any difficulties encountered with regard to information, possible contraindications, or anything else that should be brought to radiologist's attention. Notes any special orders or change in procedure decided by radiologist.

b. Performer may accompany radiologist to examination room and introduce patient to radiologist.

c. During radiologist's review of requisition, prior films and examination of patient, performer notes radiologist's orders:

- i) If radiologist decides to terminate procedure, performer proceeds to termination steps described below. If appropriate arranges to have proper forms filled out.
- ii) If radiologist decides that additional cleansing is needed, performer may arrange to have this carried out and/or performer arranges to reschedule patient.
- iii) If not already done, performer notes radiologist's order for scout film. Notes patient position, projection and centering ordered or plans to carry out standard procedure.

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8. Unless already done, performer selects and sets the technical factors for the scout film of the abdomen (or the next overhead radiograph). a. Performer consults the technique chart posted for the machine. Locates the information needed for the body part and projection involved according to the centimeter thickness of the part as measured for the position and the collimated field size to be used. Makes sure that technique relates to the combination of film type and speed and use or nonuse of other accessories (such as screens, grids, bucky, etc.). b. Makes note of the kVp, mA, T(seconds of exposure time), focal spot size, and the focal film distance (TFD or FFD) called for. c. Once the standard kVp, mA and time have been determined, performer makes any conversions necessary to account for extreme fat or muscularity, age, the preference of the radiologist involved, and any other conversion needed such as posted changes. Performer looks up numerical conversion factors and calculates or uses conversion charts to ascertain the appropriate new exposure factor (kVp, mA and/or time). Multiplies, divides, adds, or subtracts as appropriate. d. Performer checks any new or unfamiliar exposure factors against the posted limits of the x-ray tube on a tube rating chart to be sure that technique does not exceed the heat capacities of the tube for the focal spot size to be used. If appropriate, performer reconverts the technique to an equivalent output using higher kVp and lower mAs.	e. Performer sets the exposure factors as selected: i) Sets control for radiography mode. ii) If appropriate, checks line voltage meter and, if needed, turns compensator dial until needle is aligned properly on line meter. iii) For conventional exposure control, performer sets the milliamperage selected for the correct focal spot size. Sets the selected exposure time that will produce the mAs desired. Sets the kVp selected by choosing the combination of major kilovoltage and minor kilovoltage settings to produce the desired kVp. iv) For automatic phototimed exposure control, performer sets the category corresponding to the type of study and use of screens, bucky, etc., and, if appropriate, focal spot size. Sets a control corresponding to the selected field size (as listed on technique chart for phototiming). May set a kVp range button, if called for with equipment, corresponding to the appropriate kV range for the examination. Sets a density selector corresponding to the usual (or special) requirements for the study. Makes sure backup timer is not likely to terminate exposure before phototimed exposure is made. v) Depending on the equipment, may set controls to provide for use of bucky, manual tableside adjustments of table and tube height, position, and of collimation.

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f. Performer obtains the appropriate size loaded cassette for the first (or next) scout projection. Attaches identification information to the cassette or table top:

   i) Places right or left marker on film holder or table-top as appropriate or depresses appropriate R or L button for automatic marking.
   ii) If patient's identification information is in the form of lead numerals or marker, performer places on appropriate corner of cassette.
   iii) If patient identification information is to be entered by use of flasher, sets flash card aside for later use with space created by piece of leaded rubber on appropriate edge of cassette.
   iv) Performer may place patient's card into card tray for equipment using automatic film marking device.

g. Performer places cassette in bucky. May manually pull out bucky tray and open retaining clamps. Inserts cassette into bucky tray and pushes back. Makes sure clamps are closed. Moves cassette into appropriate "stored" position or inserts cassette tray into bucky slot and centers.

9. The performer positions the patient for the first or next scout film in the supine AP position unless otherwise specified. Plans to center to abdomen and/or right abdomen depending on standard institutional procedures.

   a. Performer may explain or demonstrate to patient what is required. May obtain help in positioning.

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   b. When positioning a patient with a balloon catheter in place, performer makes sure that the clamp is not lying over a part to be exposed or that patient is not lying on the clamp.
   c. For supine AP projection (posterior view) of the abdomen, performer has patient lie in a supine position on table.

      i) Centers the median sagittal plane of the body (or center of right side of abdomen) to the midline of table. Arranges shoulders and hips to lie on single transverse planes.
      ii) Has patient flex elbows and abduct arms. For thin patients or if so ordered performer rotates the body slightly with right side against table. Supports knees and immobilizes ankles.
      iii) Performer centers the cassette at the level of the iliac crests unless otherwise specified.
      iv) Directs central ray at right angles to the midpoint of the film.

   d. Performer may apply a compression band and air filled bag to upper abdominal region.
   e. Checks whether patient is able to relax as positioned and immobilized. If not, performer readjusts and recenters until patient is comfortable.
   f. Performer rehearses patient in breathing in, breathing out fully, and holding breath while remaining relaxed until told to breathe again (or in suspended inhalation if so ordered).
   g. Performer sets the focal-film distance if not already done as appropriate. Checks the focal-film distance by reading indicator

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scale in the tube housing; adjusts up or down until the required FFD (TFD) is obtained.

h. Performer checks final positioning by using light in collimator. Activates the collimator light and points the light beam towards the part. Adjusts the collimator opening to correspond to the film size. Uses cross-hair shadows as reference for center of field. Checks that primary beam will enter the center of the area of interest at the selected angle to the film so as to project the view desired. Performer adjusts the collimator so that a small unexposed border will appear around the edge of the film or collimates further so as to expose only the area of interest (and thus provide maximum protection and detail). Adjusts primary beam to minimum size needed to cover the area(s) of interest.

i. Performer adds lead shielding to areas that will be in the primary path of the beam but are not included in the areas of interest, especially gonads. Provides patient and everyone who will remain in room during exposure with appropriate protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.

j. When everything is ready for the exposure, performer reminds patient of the breath control to be used for exposure. Encourages patient to relax. Observes the patient's movement until the moment that the exposure is made. Readjusts position if warranted.

10. Performer returns to control room.

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a. Makes sure controls are properly set for radiography mode and that patient is still in position.

b. Tells patient when to take a deep breath and exhale and hold still while relaxing, as rehearsed, by calling or using intercom.

c. When respiration has been suspended, performer waits one or two seconds to allow involuntary movement of viscera to subside and then makes exposure or waits number of seconds judged necessary for patient to relax.

d. Performer initiates exposure by pressing hand trigger or exposure control button.

  i) While exposure is underway performer checks that mA meter records appropriate current as set, that kVp meter dips slightly.

  ii) May watch for evidence of malfunction such as line surge or excessive drop; may listen for sound of normal functioning of equipment. If there is malfunction may decide to report; anticipates need to repeat exposure.

  iii) With phototimer notes whether backup timer has been involved in terminating exposure before phototimed exposure was completed. If so, anticipates possible need to repeat exposure.

  iv) After exposure is completed tells patient that he or she can breathe.

  v) If the exposure is terminated by a circuit breaker, rechecks technical factors for possible overload or checks for overload elsewhere on circuit. Anticipates need to repeat exposure.

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e. After exposure removes cassette and removes markers for further use.

11. The performer arranges to have the scout film processed at once or decides to do personally.

   a. Attaches ID card for use with flasher if appropriate. May sign requisition.
   b. While film is being processed and/or evaluated performer has patient relax in examination room or holding area. Explains what will happen next. If appropriate, makes sure that patient will be attended while waiting.
   c. If appropriate, moves x-ray tube and any protruding film holder away from patient before patient rises. May decide to assist patient from table. Makes sure patient is reminded of any footrest in stepping off table.
   d. Performer places processed scout film on view box. May display prior films as well. Notes radiologist's orders:

      i) Performer notes whether radiologist requires a change in technical factors and/or patient positioning or centering for later overhead filming.
      ii) Notes radiologist's final orders on sequence of examination. Discusses sequence and timing for procedures such as fractional filling with spot films and/or overheads with radiologist.
      Notes radiologist's orders for program and settings for spot filming and sets or resets as appropriate. May arrange signals for exposure, changing of spot film cassettes, operation of exposure controls.

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12. If appropriate, performer prepares for injection of contrast:

   a. Arranges to provide or change any equipment or supplies as ordered by radiologist.
   b. Arranges to have patient prepared for surgical procedure (for percutaneous cholangiography) or T-tube instillation by having patient lie in supine position on table.
   c. Performer gives leaded gloves and apron to radiologist. If appropriate, places leaded curtain in place. Provides patient and everyone remaining in room during exposure with appropriate protective shielding. Explains if necessary that this is not cause for alarm but a general precaution to minimize unnecessary radiation exposure.
   d. Washes hands, observing sterile technique as appropriate.
   e. If appropriate, performer opens packet of sterile gloves for radiologist, observing sterile technique, so that wrapper, own hands, or other objects will not contaminate gloves.
   f. May assist as appropriate by handing materials asked for such as in anesthetization of patient for percutaneous injection or preparation for T-tube injection. Observes sterile technique.
   g. On signal from radiologist, performer may dim room lights. Turns on TV power switch. May go to control room and operate fluoroscope controls on orders from radiologist. Adjusts kVp and/or mA controls according to radiologist's orders until visualization is adequate.

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- i) For percutaneous injection performer repeats as appropriate while radiologist places needle, tests for bile, and makes test injection under fluoroscopic control.
- ii) May help position patient in right AP oblique position or as ordered. May position compression devices as ordered.

h. Performer may assist radiologist with spot filming:

- i) Operates exposure controls as ordered, or positions table, tube, or patient as ordered.
- ii) If spot film attachment uses cassettes, performer may unload as used, identify, and insert additional cassettes, as described above, throughout procedure.

i. Depending on institutional procedures, performer may keep radiologist informed of cumulative exposure as shown on fluoroscope timer indicator.

j. For fractional filling performer repeats appropriate steps as ordered. If appropriate, makes overhead exposures as ordered as described below.

13. Throughout procedure or when the fluoroscopic portion of the examination is over, performer notes radiologist's orders for standard or special overhead films. Notes patient positions, projections, tube angulation, breath control and centering ordered. Notes time elapse ordered for each series.

a. Performer is careful not to dislodge puncture needle or drainage tube left in place after puncture, or T-tube left clamped and in place.

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b. Performer plans each series for appropriate intervals and marks each cassette to indicate the time elapse and/or use of suspended inhalation if so ordered.

c. If centering has not been indicated by radiologist, performer judges the location of the biliary area based on the patient's type of body (habitus) and the evidence of any prior films. Plans to adjust for higher centering for supine positions and obese, hypersthenic patients, and lower centering for prone or erect positioning and thin, asthenic patients.

d. Performer resets technical factors as appropriate for each projection to account for use of contrast and any orders from radiologist after having reviewed scout (and later) films.

e. Throughout procedure performer remains alert for any symptom of severe pain or adverse reaction to the contrast. As soon as performer judges that reaction may be severe, ceases exposure and notifies radiologist or attending physician at once.

14. Performer positions patient for overhead views of biliary ducts as follows or as described earlier, depending on the position(s) ordered:

a. For a right AP oblique projection (right posterior oblique view) of the extrahepatic bile ducts, performer has patient assume a supine position with the estimated area of the biliary tract centered to the midline of the table.

- i) Elevates the left side of the body about 15° to 20°. Supports the elevated shoulder, hip and knee. Has patient extend hips

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and knees so that back is arched. May place arms in comfortable position with hands under or above head.

ii) Centers film to estimated biliary tract area adjusted for patient's position and body type or as indicated.

iii) Places inflated bag or radiolucent wedge under abdomen.

iv) Directs central ray at right angles to midpoint of film or at 20° cephalad to the center of the film.

b. For an erect PA projection (anterior view) of the biliary tract, performer has patient stand in PA position facing vertical cassette holder or bucky.

i) Has patient distribute weight evenly. Supports shorter limb if limbs are of unequal length.

ii) Centers estimated area of biliary tract to midline and film to estimated level of biliary ducts adjusted for position and body type.

iii) May have patient extend chin over top of cassette. May have patient extend arms along sides of holder and grasp edges.

iv) Applies compression as appropriate. If patient has gallbladder, performer makes sure that patient is maintained in erect position long enough before exposure for small gallstones to be accurately demonstrated.

v) Directs central ray at right angles to center of film.

c. For right lateral decubitus positioning for projections of the biliary tract, performer uses a vertical bucky or cassette holder with patient lying on table. Notes whether PA or AP projection is required.

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i) Has patient lie on right side with left side supported and film placed vertically in front of patient with tube positioned horizontally behind (for PA projection) or the reverse (for AP projection).

ii) Centers film to estimated area of biliary ducts adjusted for likely drop in location of gallbladder (if present) in this position toward the midaxillary line.

iii) Has patient flex knees comfortably. Places supports under and between knees and ankles. Has patient flex elbows, place lower hand under head, and has patient grasp side of table with opposite hand. Elevates the torso.

iv) May apply compression. Allows patient with gallbladder to maintain position long enough before exposure for small gallstones to be accurately demonstrated.

v) Directs central ray horizontally at right angles to midpoint of film.

vi) For a lateral view centers cassette in bucky on table and directs central ray vertically at right angles to center of film.

d. Performer repeats shielding and collimation steps as appropriate as described above. For small fields performer attaches an auxiliary extension cone to collimator to further reduce the primary beam.

e. Performer rehearses patient in suspended exhalation (and/or suspended inhalation if so ordered) while remaining relaxed.

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f. Performer makes exposure as described earlier, waiting a few seconds after suspension of respiration.

15. Performer arranges for processing and review of spot films and each overhead view as taken:

    a. May sign or have radiologist sign requisition sheet.
    b. Checks that equipment is turned off.
    c. With cassette spot films and overhead exposures, removes any markers for further use. Attaches ID card for use with flasher if appropriate.
    d. With spot film camera, performer advances the film so that all exposures made will be wound on the take-up spool in the roll film cassette. Replaces dark slide on camera lens. Uses device to cut film and create a light shield. Resets counter and removes film cassette.
    e. Performer has overheads and spot films processed at once or decides to process personally.
    f. While films are being processed, makes sure that patient is comfortable and, if necessary, attended by radiologist, staff member, or self.
    g. When the overheads and spot films have been processed and returned, performer places on view boxes. May also hang scout and prior films. Informs radiologist that radiograph(s) are ready for viewing and makes note of radiologist's decisions:

        i) Notes orders for change in technical factors, change in patient positioning, centering and/or tube angulation.

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        ii) Notes any decision by radiologist to inject more contrast and repeat any portion of the procedure.
        iii) If the radiologist indicates that there is any problem with the technical factors or the patient positioning for overheads, performer records or notes for use in "retakes." Notes whether need to repeat is due to performer's own negligence or lack of attention so that performer can avoid future "retakes." If request for retakes reflects malfunctioning equipment, performer reports malfunction to appropriate staff member. If request for retakes reflects the preference for density or contrast of the radiologist, performer notes for future use to avoid future "retakes."
        iv) If radiologist requires additional centering and/or positions, performer repeats overhead filming as appropriate to new projections, as described above.
        v) For further overhead exposures performer repeats appropriate steps including identification of cassette, use of R-L and series markers, selection and setting of technique, positioning patient and equipment for focus-object-film alignment, collimation, shielding, breathing instructions, making exposure, and processing, as described above.
        vi) Performer refrains from commenting on the films or providing any interpretation to patient.
        vii) Performer shows subsequent radiographs to radiologist as

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processed. Keeps track of timing and continues at appropriate intervals or as ordered and proceeds as described above until radiologist indicates that examination is completed.

viii) Notes any orders for delayed film. If so, performer may provide requisition sheet and have radiologist fill out and sign.

16. When performer is told by radiologist that the examination has been completed, performer carries out termination steps for the examination:

    a. If appropriate, arranges to have fresh dressing applied to T-tube (if removed for radiography). Has patient cleaned if appropriate. Removes any R-L markers or centering marks from patient's body.
    b. May have patient transported back to holding area or next location, or decides to do personally, as appropriate. Makes sure that none of the equipment is projecting over the patient before allowing patient to rise.
    c. If appropriate, makes sure that patient is in the care of a staff person who will transport to appropriate next location or, if outpatient, will arrange to discharge or send patient home (with escort if appropriate).
    d. May have room and equipment cleaned; has any other appropriate clean up procedures followed to avoid infection or contamination, or decides to do personally, depending on institutional procedures.
    e. Performer records the examination according to institutional procedures. May include date, room, examination type, the overhead views taken, the technical factors used,

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    and film sizes. May record the number of exposures made of each spot film and overhead view including retakes; may enter the estimated radiation dose to which patient was exposed (using posted information on dosage); may record any problem with equipment, any special care provided patient. Signs requisition sheet.
    f. Performer may record the fluoroscopy examination including exposure time and rad dosage.
    g. May present requisition form to radiologist for comments and signature. May present forms for requisitions for later delayed films.
    h. Performer may decide to jacket radiographs, requisition sheets, and related materials, and/or have information recorded in log book personally, or have this done, depending on institutional procedures.
    i. May indicate to appropriate staff person when the performer is ready to proceed with next examination.

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